

FLIGHT

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AND AIRSHIPS

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EDITORIAL COMMENT



NCE more the debate on the Air Estimates in the House of Commons has resulted in a striking vindication of the opinions repeatedly set forth in *FLIGHT* on the subject of Air Defence. The most salient of the points are: (a) The value of international agreements for the restriction of "frightfulness," (b) the need for parity at least with other Powers in our air strength, (c) the value of efficient defence preparations, and (d) that it is to peaceful policy rather than to disarmament that we must look for preventing war.

The Estimates Debate

All these points were well brought out by Mr. Winston Churchill in a speech which has been described as the best speech which he has made in the present Parliament. Though Mr. Churchill is not the most consistent of politicians, he is certainly one of the clearest thinkers as well as one of the most able administrators in public life to-day. He is also the deepest student of war among our politicians, and his opinions on what belligerent nations are likely to do counts for far more than the opinions of many men who took up fighting or military administration during the four years 1914-18. His intervention lent special distinction to the debate, and it also had the effect of bringing forth some weighty statements from Mr. Baldwin, who, as Mr. Churchill reminded the House, wields more actual power than does the Prime Minister. Mr. Baldwin sometimes talks like one who depends for his opinions merely on the sensational daily newspapers, but a few seconds later he will express himself as a deeply thoughtful statesman. He is, in fact, far more of a statesman than of a politician. On this occasion the amount of agreement shown between Mr. Baldwin and Mr. Churchill was one of the most satisfactory features of a notable debate.

The debate is summarised on another page, and we shall not repeat that summary here. We may point out, however, that in our leading article of February 8, dealing with "frightfulness" attacks on a civil population, we wrote: "We can conceive only two possible cases of such an outrage: (1) If a nation were so confident of its own strength that

DIARY OF CURRENT AND FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in this list:—

- 1934.
- Mar. 15. "Some Developments in Aircraft Construction." Lecture by H. J. Pollard before R.Ae.S.
- Mar. 21. "Some Problems of a Technical Service." Lecture by Wing Com. G. W. Williamson, before R.U.S.I.
- Mar. 24. Services Rugby: R.A.F. v. Army, at Twickenham.
- Mar. 28. Royal Aero Club Annual General Meeting.
- Apr. 5. "Engines." Lecture by Capt. A. G. Forsyth before R.Ae.S.
- Apr. 7-10. Forum Club Aviation Exhibition.
- Apr. 12. "Speed and the Future of Commercial Aircraft." Lecture by M. Louis Breguet before R.Ae.S.
- Apr. 16 23, 30. "Gyroscopes." Series of Lectures by Prof. J. G. Gray before Royal Society of Arts.
- Apr. 26. "Landing in Fog." Lecture by Dr. Rüd Stüssel before R.Ae.S.
- Apr. 27-May 6. International Aero Show, Geneva.
- May. Wilbur Wright Memorial Lecture, before R.Ae.S.
- May 17-June 2. Royal Tournament, Olympia.
- May 21. Guild of Air Pilots Garden Party.
- May 24. Empire Air Day.
- May 26. Heston Air Navigation Trials.
- May 27. Deutsch de la Meurthe Cup.
- June 1. Entries close at 12 noon for London-Melbourne Race.
- June 2. Brooklands Air Race Meeting.
- June 3. London Aeroplane Club Garden Party, Hatfield.
- June 9. Reading Ae.C. Annual "At Home."
- June 16. R.A.F. Reserve Flying Club Annual Flying Display, Hatfield.
- June 23. Lancashire Ae.C. Air Display, Woodford.
- June 30. Royal Air Force Display, Hendon.
- July 13-14. King's Cup Race.
- July 3-9. 4th International Congress for Applied Mechanics, Cambridge.
- July 7. Opening of Leicester Airport.
- July 21-22. French Grand Prix.

it could afford to indulge in brutality, and (2) if a nation were so desperate that it had lost all sense." Mr. Churchill said on Thursday last: "If one side had an all-powerful air force and the other only a very weak defence, the temptation to use the weapons of terror upon the civil population, might well far outweigh any detrimental effects on neutral opinion. If, however, the two sides were in an equality and in the same position to do equal and simultaneous harm to each other, then the uselessness of the crime would reinforce its guilt and horror and the evil effects upon the action of neutrals." Mr. Baldwin, later in the same debate, said: "The real danger to peace is a very strong air Power on the one hand, and a defenceless city on the other hand." There seems a very substantial agreement between those three statements.

It is the same with the question of Air Defence. We have frequently urged that, while no immunity from bombing can be guaranteed to London or any other city, still a strong, well-organised defence could take such toll of the raiders that they would probably soon decide that the game was not worth the candle. In particular we attacked Mr. Baldwin's recent statement that "The bomber will always get through." In Thursday's debate Mr. Baldwin asserted that he stuck to his previous statement, but then proceeded to tone it down. He said: "It is quite true that the bomber will always get through any defence you can visualise to-day, but it is equally true that the greater the force there is to oppose it the greater the chance of casualties among the bombers, and therefore the more thought before invasion takes place." Mr. Churchill likewise spoke of "the effective punishment and destruction by an active and efficient home defence of any invaders who may come to our shores . . . We should be able by those means to impose deterrents upon an invader, impose deterrents upon a potential declaration of war, and gradually to bring attacks upon us, by attrition, to smaller dimensions and finally to an end altogether." That is what General Ashmore did in 1918, and what we believe will happen again if our land is ever subjected to air attacks by an enemy. When Mr. Churchill, Mr. Baldwin, and FLIGHT are agreed upon so many vital points of Air Defence, there is small probability that their views are egregiously wrong.

The most important practical point about the debate, however, was the assurance given by Mr. Baldwin, as a responsible member of the Cabinet, that if all our efforts at disarmament fail (he would not agree with Mr. Churchill that they have yet failed, but the Lord President of the Council must be loyal to the Foreign Secretary), "then any Government of this country—a National Government more than any, and this Government—will see to it that in air strength and air power this country shall no longer be in a position inferior to any country within striking distance of our shores." No pronouncement could be more weighty than that, and it very nearly satisfied those members who had expressed most alarm about our present weakness in the air. They were inclined to ask for a time limit to the attempts to secure an international agreement on disarmament, and their request seems not unreasonable. It really looks as if Sir John Simon and Mr. Eden are prepared to go on talking and negotiating *ad infinitum*, and while they talk, foreign Powers are increasing their air fleets. Though

we are adding four-minus-one squadrons to our strength in the British Isles, we are not catching up the growth of foreign air services. On the contrary, the difference between their strength and ours is growing greater. Mrs. Tate was very sound when she asked that, if there should seem no likelihood of the success of the Air Convention within a short period of time, the Government should bring forward supplementary Air Estimates, and should not wait until next March before the matter was again considered in the House. She shrewdly pointed out that we may be faced suddenly with an enormous expense to achieve parity, and asked if it would not have been more economical to have spent a larger sum each year rather than to let ourselves fall so far behind. Capt. Balfour was also wise in asking that we should plan ahead, for at present we had not barrack accommodation for more than three extra squadrons.

From the Air Estimates we turn in conclusion to the Naval Estimates. The First Lord, Sir Bolton Eyres-Monsell, said that the Fleet depended more and more upon its naval Air Arm. "We regard it," he said, "as the spearhead of the Fleet, and are prouder of our naval Air Arm than of any arm of our Service." There is no "anti-air" sentiment in the present First Lord, and he is himself a former naval officer. That all lends greater weight to his very reasonable plea that controversy on the respective merits of the Navy and the Air Force was wholly mischievous, and must do great harm, not only to the two Services but to the country. FLIGHT is quite with the First Lord in holding that the two Services are complementary and both are necessary to the country.

As a result of these two debates, we feel that the prospects of air development for the defence of the country and Empire are brighter than they seemed a short while ago.

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Imperial Airways are to be congratulated on the decision to speed up their scheduled services to Capetown and Singapore. No one has ever criticised Imperial Airways for the comfort which they provide for their passengers (and comfort is of great importance on very long journeys), or for their efforts to make themselves self-supporting against the time when subsidies must come to an end. The only strong criticism ever levelled against the company has been on the ground of speed. By the present schedule their machines leave Croydon for Singapore on a Saturday and arrive on the Tuesday week—after 9½ days' travel. Next month, though the start remains on a Saturday, Singapore will be reached on the Sunday week—after 8 days of travel. The journey to Capetown will take 9 days instead of 10. These accelerations take place after leaving Brindisi, the Mediterranean being crossed in one day instead of two. When the agreement with Italy comes into force, which will make Marseilles instead of Brindisi the port of departure on the Mediterranean, a new schedule will have to be worked out. Presumably, there will not yet be night flying across the Continent, so that the new arrangements will not be all pure gain.

Next month it will be possible to reach India (Karachi) in 5½ days and Calcutta in 6. That is a great advantage. We hope this is but a foretaste of further accelerations in the near future.



Calshot

By MAJOR F. A. de V. ROBERTSON, V.D.



ON a fine day there are few more charming spots in Great Britain than Calshot. For those who know it not we may explain that it lies at the junction of Southampton Water with the open Solent. Every year thousands of passengers on the Southampton-Cowes steamer pass close to it, and now and again they see the steamer heave to while a launch comes out from the seaplane station and takes airmen off to the little pier. Several times during the last seven years, when the R.A.F. High Speed Flight has been stationed at Calshot, either training for a Schneider contest or preparing for an attack on the world's high-speed record, Calshot has been the chief centre of interest in the whole of the British Isles. Those high-speed occasions recall very pleasant memories to the correspondents who were given free run of the station, for waiting for something to happen on the con-

crete of Calshot is vastly preferable to hanging about in similar circumstances on most inland aerodromes. At Calshot there is always something of interest to watch—if not a racing seaplane or a flying boat, then at least an Atlantic liner starting for New York or returning therefrom. On a clear day one has three shores to watch, with Lee-on-Solent just across Southampton Water, and the Isle of Wight to the south.

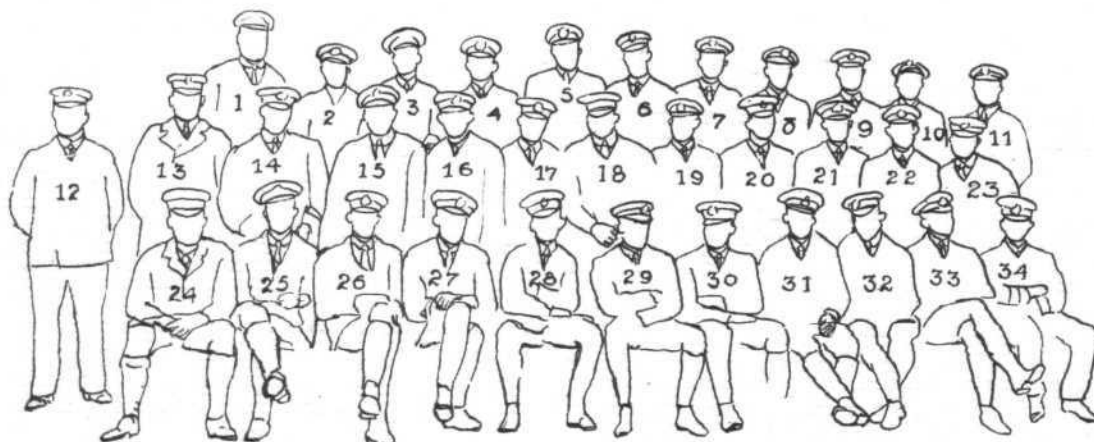
The centre and the oldest feature of Calshot is the Castle, which many suppose to be a Martello Tower, but which is not so. It certainly dates from days when there were no flying machines. As a flying station Calshot has quite an honourable length of history. In 1912, following the formation of the Royal Flying Corps with Naval and Military Wings, the Admiralty chose Calshot to be one of a series of seaplane stations round the coast. Its



CRAFT OF THE SEAPLANE TRAINING SQUADRON: The machines from left to right are Fairey "Seal," Avro "Tutor," Saro "Cloud," Hawker "Osprey" and Supermarine "Southampton." (FLIGHT-Photos.)



A GROUP OF R.N.A.S. OFFICERS AT CALSHOT IN 1914 : Back row—(1) Staff Surgeon O'Connell, (2) Flt. Lt. F. G. Brodribb, (3) Flt. Lt. A. J. Mackean, (4) Flt. Lt. E. R. C. Nanson, (5) Flt. Lt. Lord Edward Grosvenor, (6) Flt. Lt. I. G. V. Fowler, (7) Flt. Lt. W. G. Sitwell, (8) Flt. Lt. R. H. Kershaw, (9) Flt. Lt. D. Hyde-Thomson, (10) Flt. Lt. R. P. Ross, (11) Flt. Lt. H. A. Busk. Middle row—(12) Mr. W. A. Hancock, (13) Mr. F. W. Scarff, (14) Flt. Lt. H. A. Williamson, (15) Flt. Lt. Cave-Brown-Cave, (16) Flt. Lt. J. T. Cull, (17) Flt. Lt. F. W. Bowhill, (18) Flt. Lt. A. C. Barnby, (19) Flt. Lt. E. T. R. Chambers, (20) Flt. Lt. H. Fawcett, (21) Flt. Lt. A. W. Bigsworth, (22) Sqd. Com. J. W. Seddon, (23) Flt. Lt. R. J. Boné. Seated—(24) Flt. Com. C. E. Rathbone, (25) Flt. Com. J. T. Babington, (26) Flt. Com. D. A. Oliver, (27) Flt. Com. F. E. T. Hewlett, (28) Sqd. Com. C. E. Risk, (29) Wing Com. F. R. Scarlett, (30) Sqd. Com. A. M. Longmore, (31) Sqd. Com. R. Gordon, (32) Sqd. Com. R. H. Clark-Hall, (33) Flt. Com. J. L. Travers, (34) Staff Surgeon O'Hea.



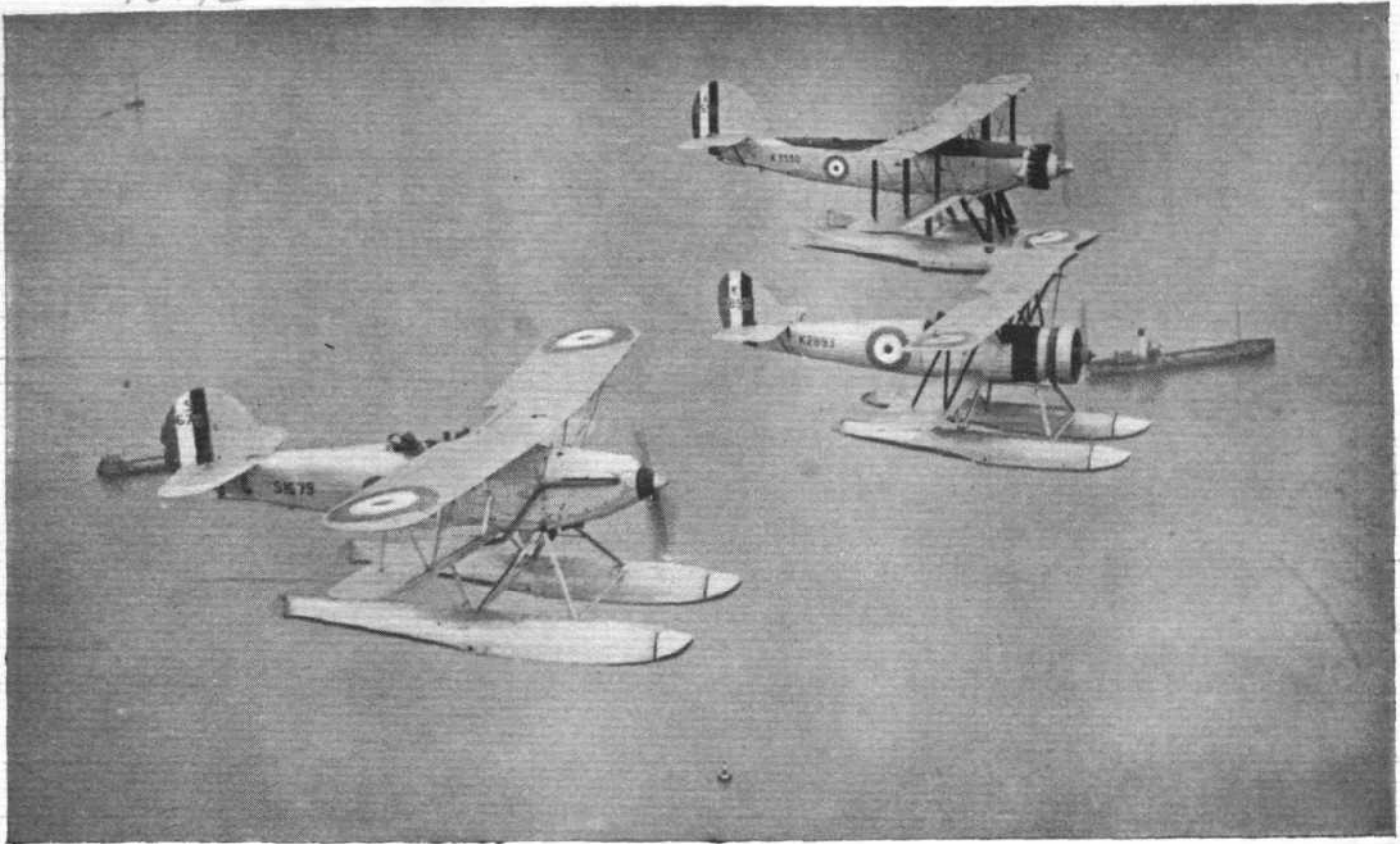
first commanding officer was Lt. Spenser D. A. Grey, R.N. On this page we publish a group of R.N.A.S. officers at Calshot in 1914, taken just before the war. There are many well-known names in the group. Throughout the war Calshot trained seaplane pilots, but from 1917 onwards developed also into a base for anti-submarine patrol work, for which seaplanes were especially suitable. After the Armistice, Calshot became a school of naval co-operation and aerial navigation. In 1922 some flying boats and personnel from No. 230 Squadron at Felixstowe were moved to Calshot, and ultimately developed into No. 201 (Flying Boat) Squadron, which still has its headquarters at this base.

It is really quite a little bit of an effort for men who have time and again haunted Calshot on high-speed occasions to turn their minds from the comparative frivolity of racing seaplanes to the good solid work of flying boats. Yet, after all, there is no branch of R.A.F. work which is of greater importance to the Empire than the work connected with flying boats, and there is certainly none which it is more fascinating to study. It seems pretty clear that the pilots get bitten by the work and speedily become enthusiasts about it. In winter the water is cold, as well as the air, and there are difficulties and problems about all forms of seaplane work which never worry the pilot of land-planes, but the boat pilots become sailors as well as airmen and get the sea as well as the air into their blood. Everyone knows what that means to a Briton.

In Air Force parlance, Calshot is a Base. Its functions are three. First it is the home of the Seaplane Training Squadron which carries out flying training on marine aircraft for the whole Royal Air Force, including the Fleet Air Arm. Its duties comprise putting pilots through the Flying Boat Pilot's Course, conversion courses, refresher courses, and providing facilities for flying for the officers of the Base. Secondly, Calshot is responsible for a long specialist course in navigation, and when a man has successfully passed through that course he is entitled to write the initial or symbol (N) after his name in the *Air Force List*. Thirdly, Calshot is the home of No. 201 (Flying Boat) Squadron. Calshot also trains the crews of marine surface craft of the R.A.F. (see page 242).

In this article it is only possible to give some brief accounts of the first two functions of Calshot. No. 201 (F.B.) Squadron must be dealt with in a separate article in a subsequent issue of *FLIGHT*.

The Navigation Course takes 32 weeks, including two weeks' leave. In that time the officers under instruction spend 900 hours at lectures and in the air. The division of time which is considered right is 70 hours on instruction in the air and 830 hours at lectures. The subjects in the syllabus include logarithms and nautical astronomy, an important subject which should occupy 150 hours; general navigation with practical work in marine craft, which is normally carried out in one of H.M. ships attached to H.M. Navigation School, Portsmouth; air pilotage and

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A FLIGHT OF THE SEAPLANE TRAINING SQUADRON: "Osprey" and "Seal" led by "Tutor." (FLIGHT Photo.)

dead reckoning; tides, maps, charts and projections, and instruments; and meteorology. The officers under instruction spend one week at the Ordnance Survey Office in Southampton to study that part of the business from another point of view. It is a very strenuous course, and so it ought to be, for it is necessary to feel complete confidence that when an officer can write the symbol (N) after his name he is a thoroughly good navigator.

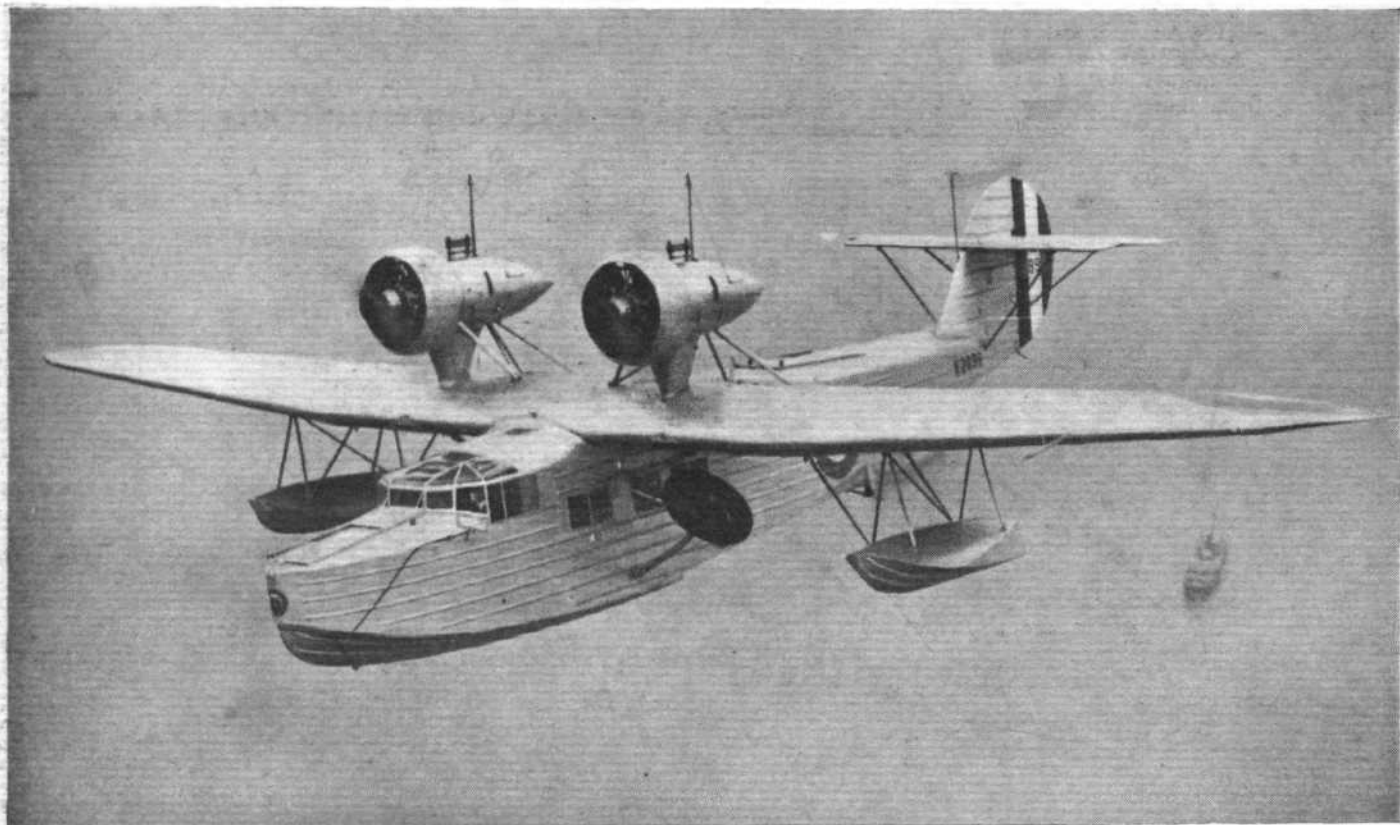
While the long Navigator's Course is the most ambitious work carried out at Calshot, the function which takes up most of the time and energies of the officers of the Seaplane Training Squadron is the Flying Boat Pilot's Course. All the pilots of all the flying boat squadrons in the country and overseas have to pass through this course at Calshot. The Training Squadron was formed in 1932, and consists of a headquarters and three flights, A, B, and C. The unit is commanded by a squadron leader and each

flight by a flight lieutenant. There are also two flying officers in each flight and the squadron has an establishment of 120 airmen.

"A" Flight carries out preliminary training in float-planes and possesses 10 machines, representing the types "III F," "Seal," "Osprey," and "Tutor." "B" Flight deals with the Saro "Cloud" amphibian, of which it has five on charge. This is a new type in the R.A.F. and is specially suitable for instruction. On a recent visit to Calshot, by kind permission of the Air Ministry, the present writer was given a flight in a "Cloud," and could form some opinions of its suitability for this work. The hull is very roomy inside, which permits of a number of pupils going up together, and they can also gather round the table to study charts, or any other matter which the instructor wishes to explain on paper. The windows are sufficiently large to give a good view of the sea and coast



SIGNALLING INSTRUCTION: On the left an airman signals with flags on top of Calshot Castle beside the mechanical semaphore, and on the right the Aldis lamp is being used. (FLIGHT Photos.)



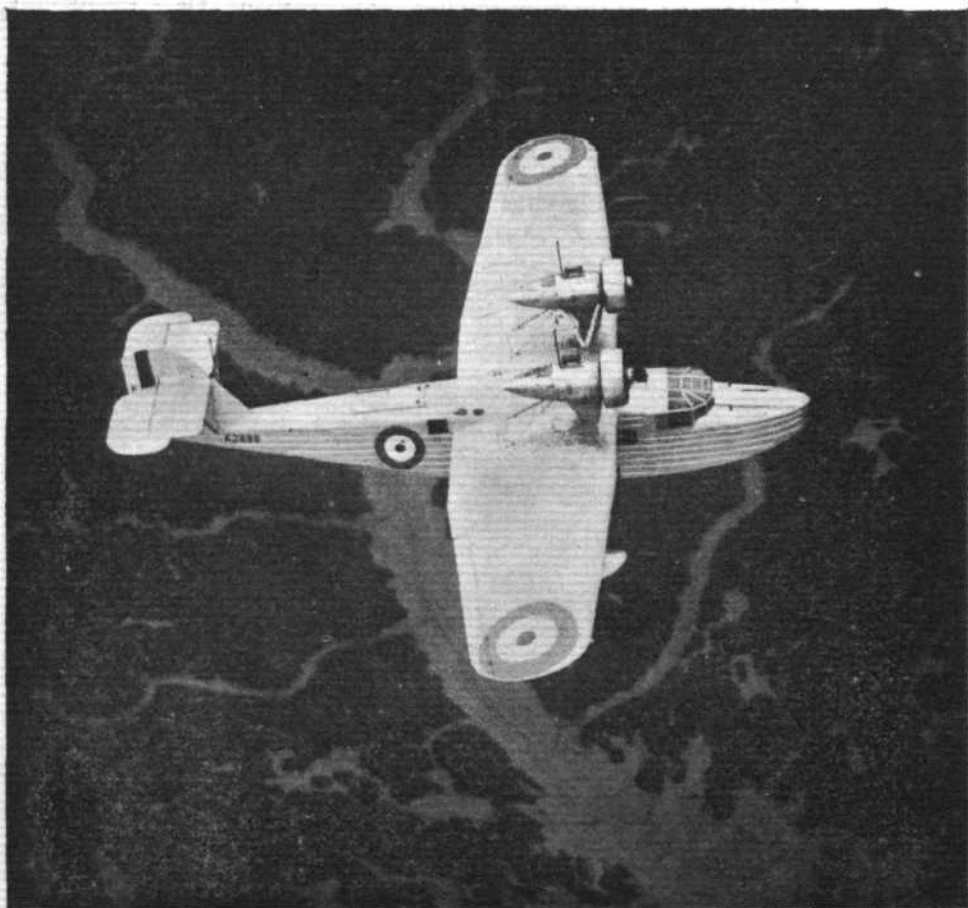
down below, which is another important point when giving instruction. The arrangement of the high-wing monoplane also adds to the wide view which is obtained. Finally, but by no means the least important point, the two pilots' seats in the nose are enclosed by unsplinterable glass, while the hatch in the top of the hull by which one enters is covered by a plate, so that the inside of the hull remains dry. Some flying boats do ship a certain amount of water through open cockpits when taking off in wet weather, and one could hardly expect full concentration from pupils if they were suffering from wet and

cold. Altogether the "Cloud" is very comfortable, and serves its purpose well. Having done their work in training type boats with "B" Flight, the pupils pass on to "C" Flight, which puts them on to Service type boats, namely, "Southamptons," of which seven are kept, and when they have finished their work on them they are fully qualified for posting to a flying boat squadron—where, of course, they will go on learning and acquiring experience.

In addition to the considerable instruction given in the air to pupils of Flying Boat Pilots' Courses, there is also an extensive system of ground training.

The Navigation School Instructing Staff consists of one squadron leader "N," two flight lieutenants and three flying officers, who are all qualified lecturers on such ground subjects as compass adjustment, dead reckoning navigation, seamanship and instruction in tactical subjects which is carried out in a section known as the Tactical Room, situated in Calshot Castle. The floor of the Tactical Room is marked out in lines of latitude and longitude, and problems of patrol and search, and Fleet co-operation, are solved with the aid of models of the various types of warships.

At some time during the course the pupils visit H.M. Submarine School at Fort Blockhouse, where they are taken to sea in a submarine. Arrangements are made for a flying boat from Calshot to patrol above the area in which the submarine is manœuvring. This enables the pupils to gain a knowledge of the field of vision possible between a submarine and aircraft.



A SARO "CLOUD" OVER SOUTHAMPTON WATER: In the lower picture the white flying-boat shows up well over the mud flats. (FLIGHT Photos.)

ON THE SLIPWAY: In the top picture an "Osprey" is about to be beached, and airmen are arranging the trolleys under the floats. In the middle picture a "Southampton" is being launched, and in the bottom picture airmen are receiving instruction in mooring tackle. (FLIGHT Photos.)

A reciprocal visit to Calshot is paid by the R.N. officers attending the Submarine Commander's Course at Fort Blockhouse. The Submarine Commander's Course pupils are taken for a flight in a flying boat which patrols over an area in which a submarine is carrying out manoeuvres. Thus the prospective submarine commanders are able to view the susceptibility of a submarine to attack by aircraft.

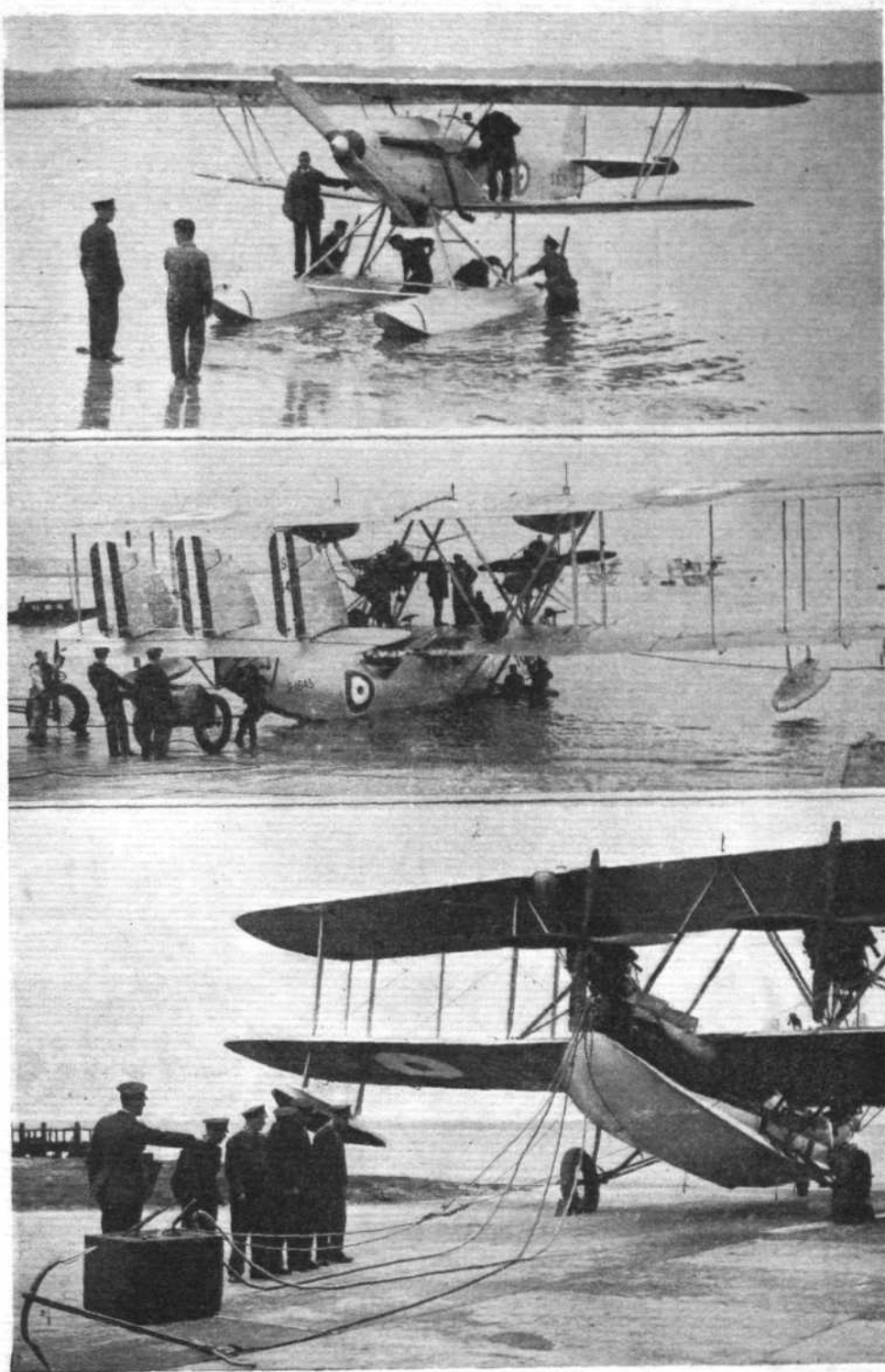
The Flying Boat Pilot's Course lasts for six months, and a batch of 12 pupils arrives at Calshot every three months. Each pupil gets about 100 to 140 hours in the three classes of marine aircraft, float-planes, amphibians, and Service boats. Men who are expert landplane pilots find that they have a great deal to learn, as most of their difficulties arise when they are on the water. They have to learn to taxi in rough seas, to moor in difficult tides and winds, and to master all the little problems connected with anchoring, coming up the slipway, being taken in tow, etc. On land a forced landing, successfully brought off, usually ends the matter, but at sea it is only the beginning of troubles. Then in particular the qualities of good seamanship are called for in the pilot and the whole crew. It is not every good landplane pilot who can acquire the sea spirit. Sometimes a prosaic tendency to *mal de mer* sends them back to types of aircraft which deal with only one unstable element. Such cases are, however, exceptional.

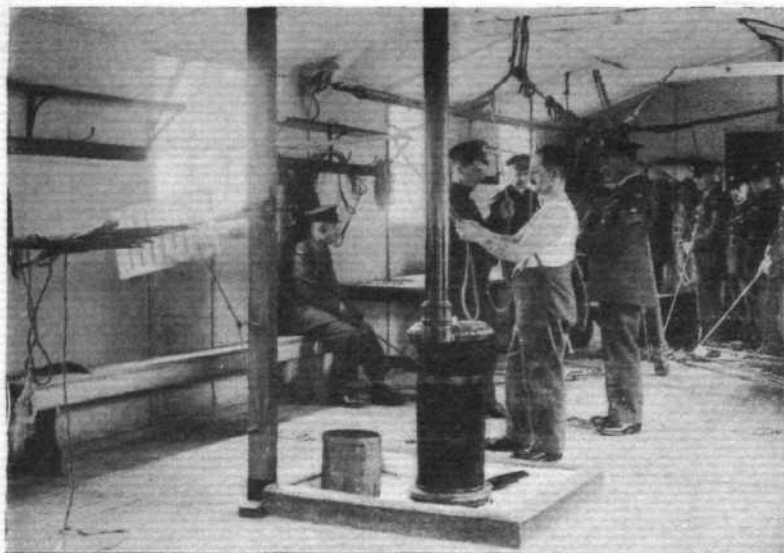
The really attractive part of the course begins when, after all the preliminaries on float-planes and amphibians have been mastered, the pupils pass into "C" Flight for the second half of the course.

By that time the pupil has attended lectures and had practical instruction in signals, flying boat reconnaissance, D.R. navigation, meteorology, compasses and instruments, tides, patrol and search, besides such ordinary subjects as rigging and engines, armaments and photography. In "C" Flight longer and advanced navigation flights are carried out, involving interception, constant bearing, and radius of action to a second base. Exercises in patrol and search; anti-submarine patrol, and course and speed judging are also carried out. These exercises are occasionally carried out away from home, and the pupils get practice in anchoring in strange waters, etc. Pupils also go as passengers on night flights, and so gain experience of the methods of signalling used, the layout of a flare path, etc. Instructors go with the pupils wherever possible on these flights and exercises, and as soon as they have returned to the base the exercises are discussed and criticised in the lecture room. One particularly useful exercise which has recently been instituted is to intercept liners and to judge their course and speed. The steamship companies very sportingly co-operate in this, and the ships themselves confirm or correct the estimates made by the pupils. For

this purpose five shipping companies have been provided by the Air Ministry with Aldis lamps, with which they signal to the flying boats.

The culmination of the course is a cruise of 10 days in Home waters. Usually this cruise takes the pupils to Stranraer or Oban in Scotland, via either the East or West Coast. In the winter months, when the cruise takes place in November and March, bad weather is often met, and this taxes the newly-acquired skill and knowledge of the pupils, and gives them excellent training. Visits are also paid to Northern Ireland, usually to Cultra in Belfast Lough, and also to some of the many islands off the coast of Scotland. On these various trips they get good experience in anchoring in strange waters. In fact, they meet with all sorts of incidents of travel, and the experience makes them versatile (they have to be "handy men") and teaches them to rely on their own resources. Least of all among the squadrons of the Royal Air Force must the flying boat units be tied to their home station. They have to venture forth with their house, so to speak, on their back, and prove themselves masters of any situation with which they may be confronted.

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THE MARINE SECTION ASHORE : Airmen receiving instruction in knotting, compass, and other work connected with the marine craft of the section. (FLIGHT Photos.)

Royal Air Force Squadrons

OTHER descriptive articles concerning the work of various R.A.F. Squadrons, etc., have been published in FLIGHT as follow:—

H.M. Aircraft Carrier *Glorious*. May 16, 1930.
No. 4 (Army Co-operation) Sq., (South Farnborough); No. 17 (Fighter), Sq. (Upavon); and No. 33 (Bomber), Eastchurch. June 27, 1930.
No. 601 (County of London) (B.) Sq., A.A.F. (at Lympne). August 15, 1930.
No. 43 (Fighter) Sq. (Tangmere). September 19, 1930.
No. 2 (Army Co-operation) Sq. (Manston). December 19, 1930.
No. 101 (Bomber) Sq. (Andover). April 24, 1931.
Nos. 240 and 209 (Flying-Boat) Sq. (Mount Batten). June 12, 1931.
"1890-1912-1931." (An outline of the Growth of the R.A.F.) June 26, 1931.
Cambridge University Air Sq. (at Old Sarum). July 10, 1931.
Central Flying School (Wittering). July 17, 1931.
Submarine Aircraft Carrier "M.2." July 31, 1931.
Oxford University Air Sq. (at Eastchurch). August 7, 1931.
No. 600 (City of London) (Bomber) Sq., A.A.F. (at Tangmere). August 21, 1931.
No. 605 (County of Warwick) (Bomber) Sq. (Cas. Bromwich). April 1, 1932.
No. 40 (Bomber) Sq. (Upper Heyford). May 13, 1932.
Nos. 7 and 58 (Bomber) Sq. (Worthy Down). June 10, 1932.

A visit to H.M.S. *Exeter* of 2nd Cruiser Squadron, Home Fleet. June 17, 1932.
Oxford University Air Sq. (Eastchurch). July 22, 1932.
Cambridge University Air Sq. (Netheravon). August 5, 1932.
No. 1 Air Defence Group (A.A.F. and Cadre Sqs.). August 12, 1932.
No. 100 (Bomber) Sq. (Donibristle). August 19, 1932.
Scotland's Auxiliaries; No. 602 (City of Glasgow) (Bomber) Sq. and No. 603 (City of Edinburgh) (Bomber) Sq. September 16, 1932.
London Auxiliaries; Nos. 600, 601 and 604 B. Sq. October 20, 1932.
No. 25 (Fighter) Sq. (Hawkinge). December 8, 1932.
No. 19 (Fighter) Sq. (Duxford). January 5, 1933.
H.M. Aircraft Carrier *Courageous*. January 12, 1933.
Lee-on-Solent. February 9, 1933.
No. 23 (Fighter) Sq. March 2, 1933.
Gosport. The Fleet Air Arm Base. March 30, 1933.
Larkhill. R.A.F. Balloon Centre. June 8, 1933.
The R.A.F. Staff College, Andover. July 20, 1933.
No. 99 (Bomber) Sq. (Upper Heyford). August 3, 1933.
No. 26 (Army Co-operation) Sq. (Catterick). August 10, 1933.
No. 3 Flying Training School, Grantham. August 17, 1933.
No. 1 (Fighter) Sq. September 7, 1933.
No. 207 (Bomber) Sq. October 12, 1933.
No. 502 (Ulster) (Bomber) Sq. November 23, 1933.
North Coates Fitties No. 2 Armament Camp. December 21, 1933.
No. 14 (Bomber) Squadron. January 18, 1934.



THE MARINE SECTION AFLOAT : A Pinnace and a British Power Boat. (FLIGHT Photo.)



Help for the hospitals

On Friday, March 9, Mr. J. E. Hodgson, honorary librarian of the Royal Aeronautical Society, gave a most interesting lecture about the history and romance of flight. Mr. Hodgson is an acknowledged authority on the subject and, with the help of slides made from old and rare prints, he covered the ground in a most fascinating manner, starting from the days when Dædalus succeeded in escaping from Crete (though not so his wretched son Icarus) down to the present time. The occasion was that

of an appeal organised by Kathleen, Countess of Drogheda, on behalf of the British Red Cross Society and Order of St. John Hospital Library. A most laudable object, and those who can spare books for the library should send them to the library at 48, Queen's Gardens, London, W.2. Mr. C. R. Fairey, as President of the Royal Aeronautical Society, introduced the lecturer, and in doing so he drew attention to the recent award made by the Society to Mr. Hodgson. An award earned by years of loyal work and taking the form of an Honorary Fellowship.

FLYING TRAINING

Acquisition of the ability to land an aeroplane under difficult circumstances, particularly when the pilot has not the help of his engine, is, perhaps, due to the reliability of the modern aeroplane engine, a phase of the pilot's training which is often not given sufficient consideration. We here discuss how this is taught at one of England's most modern flying schools

SPLUTTER—POP—SPLUTTER, the engine has died on you; silence reigns supreme, and many an amateur's heart begins to bang with apprehension at the thought of the forced landing to follow.

We believe that we are by no means overstating the case when we say that the ability to handle an aeroplane with accuracy under any circumstances without the use of the engine is the highest attribute of a pilot. Despite the reliability of our modern aeroplane engines, the ordinary non-flying public remains non-flying, in a large majority of cases, solely because of the idea that a crash is inevitable if the engine fails to function. Given a well-trained pilot, this idea is a fallacy, but it must be admitted that, due to that very reliability, amateur pilots are prone to possess insufficient practice in this all-important branch of flying.

They receive some training during the time when they are learning to fly, but whereas they perforce continue to get practice in everything else, they seldom, of necessity, have to make a landing in the best available piece of ground beneath them at any given moment.

It ought to be emphasised at this point that we are not referring to that type of landing which our daily Press—notoriously incorrect in aeronautical matters—always calls a forced landing, but which is really nothing more than a landing in a carefully-chosen field for, perhaps, the purpose of inquiring the way, or may be due to inclement weather which the pilot wishes to let pass before he continues his flight. No, a forced landing is one which has to be made immediately without warning, due to some cause like an engine failure, and which only gives the pilot time to choose a field within gliding distance at that time; this will vary, of course, according to the altitude at which he is flying, hence the desirability of flying high whenever it is possible to do so.

It can easily be realised that landings of this nature, if they are invariably to be made safely, call for a high degree of skill on the part of the pilot and the ability to handle his aeroplane with accuracy. This skill can be imparted by training, but it requires practice to retain it, and we suggest that all pilots—amateurs at any rate—would benefit greatly if they were to make at least one imaginary forced landing during every cross-country trip by air. It is not always necessary actually to land, but the engine can be throttled right back and an approach made until it is obvious that the machine could be landed in the field chosen; then the throttle can be opened, and in many cases the pilot will continue on his way with an added sense of well-being and superiority over those poor mutts on the ground who haven't learnt to fly.

As we have already said, some forced landings have to be trick ones, requiring, say, the ability to lose a lot of height without gaining forward speed when coming in over a high obstacle, like a bank of trees at the edge of a small field; or in another case the only field of sufficient size may lie a long way down wind, so far that the pilot can only reach it without sufficient altitude to turn into wind and land in the normal way. He will then have to side slip during a steep gliding turn, while still well over the field, so that the drift due to the wind will not place him too far to the leeward side of the field by the time he has finished his turn and is pointing into wind ready to land. These are but two very ordinary problems, but they suffice to show that confidence in his ability to handle his aeroplane accurately, in normal and abnormal positions, without the use of the engine, is of great importance to the pilot. This point, we always feel, is the strongest argument in favour of that school of thought which maintains that a knowledge of simple aerobatics is necessary for pilots of light aircraft. Another point in favour of this contention is the fact that in very boisterous weather light aircraft in particular may often be thrown about severely; if, under these circumstances the pilot is still quite at home in his machine because he

has practised aerobatic flying, then it is obvious that he is much safer than the man who has not done so.

One of our flying training schools which makes a habit of teaching their pupils according to this dictum is Air Service Training, Ltd., at Hamble. Their methods are modelled on those in use at the Central Flying School of the Royal Air Force, adapted where necessary to suit civilian needs. For this particular phase of training they have the use of several fields where forced landing practice can be carried out. All their pupils have not only to be capable of making forced landings under any circumstances, but must also have a knowledge of aerobatics, for the reasons we have already stated.

It may, perhaps, interest and help our readers if we run through the normal procedure for making a normal forced landing.

Immediately the engine stops, the aeroplane is trimmed to its normal gliding angle, and the pilot selects the best field for landing within gliding range of his machine. Assuming that there is still a fair amount of height to be lost, a turn is made, to place the aeroplane on the lee side and within easy gliding distance of the selected field. While this is being done the pilot takes a quick look round the cockpit, attempting to ascertain the cause of the engine failure should this not already be known, making sure that he has not inadvertently knocked off the engine switches or turned off the petrol. In fact, he tries to see whether there is any obvious and remediable cause for the stoppage. If there is not, then he puts the switches to off and turns off the fuel supply, so that there will then be no possibility of the engine suddenly starting again and causing trouble just as he is about to land, and also to eliminate the danger of fire if the landing should unfortunately end in a crash.

Next a series of "S" turns are made, the pilot gliding his machine at right angles to the direction of the wind in between each turn, always turning into wind (i.e., towards the field), regulating his distance from the field according to the strength of the wind—the glide at right angles to the field gives him a good gauge of his drift—and guarding against "undershooting" as he would against the plague.

He must avoid losing sight of the field, take care to maintain his correct gliding speed and, during the earliest stages of the approach, have assured himself that the field was clear of obstacles, like high-tension cables, wire fences and so on, so that there shall be no question of changing to another field.

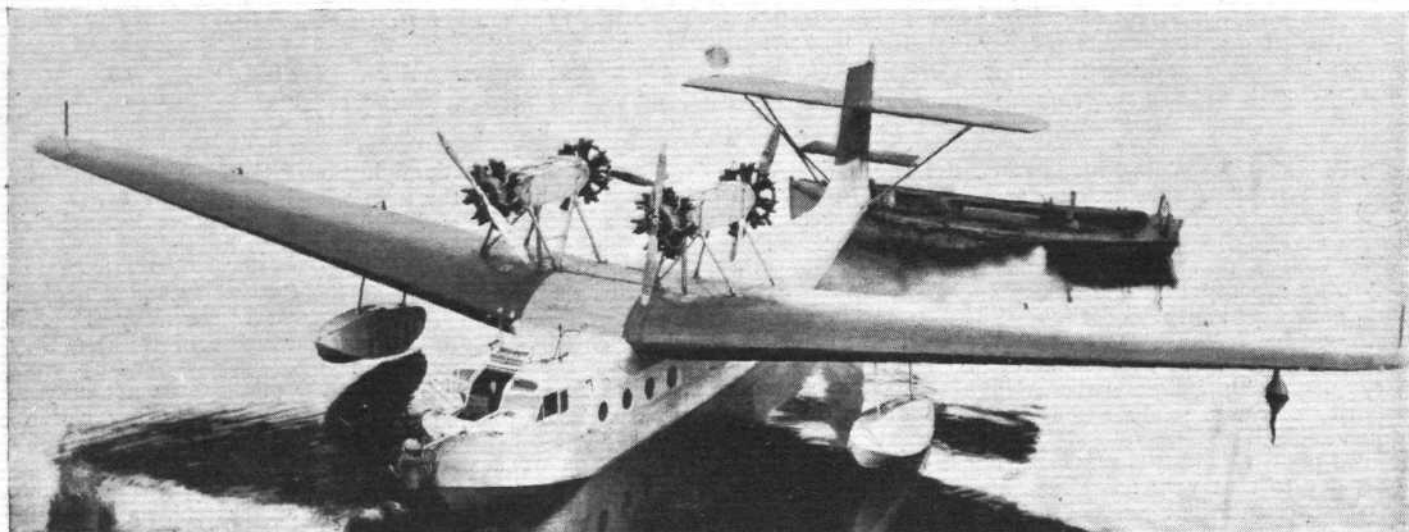
When he has lost the requisite amount of height, he should be in a position to turn into wind, glide down, flatten out, and land in a normal manner. He will have taken care to overshoot rather than the reverse. A crash from undershooting usually means running into a hedge or other boundary obstruction, with full flying speed, whereas overshooting merely gives the pilot the necessity of "slipping off" or otherwise losing a little more height before landing.

On paper, it all sounds quite easy, but there are many occasions like those mentioned at the beginning of this article, which call for a high degree of skill. Such cases are capable of infinite variety, and it is impossible in a short talk like this to give more of them. Those given should, however, show the importance which must be attached to correct training.

Pupils come from every country in the world to our flying training schools like that at Hamble, and all go back to their homes as advertisements of the thoroughness and excellence of English flying training. This article will serve to show one, at any rate, of the reasons why we have this name for thoroughness—a name of which we are justly proud and which will be maintained at all costs.—British trained pilots are the equal, in their way, of British aircraft. Can we say more?

C. N. C.

Air Transport & Commerce.



The Lioré et Olivier 24-2

IN TENDED for the Marseilles-Algiers route of Air-France, the LeO 24-2 is a cantilever monoplane flying boat, with four Gnôme-Rhône K.7 engines mounted in tandem pairs above the wing. The aircraft has been developed from the LeO 24 commercial flying boat, the good aerodynamic characteristics of which are preserved.

The wooden monoplane wing, which is in three sections, tapers both in chord and thickness, and is divided into a number of watertight compartments which would support the machine in the event of a forced landing. Plywood covering is used for the wing. All members of the *empennage* are of duralumin covered with fabric.

All metal construction is used for the hull. It is a single step flat-sided structure, close attention having been given to the question of accessibility to the interior. A mooring position is in the bows, and immediately behind this is the pilots' cabin with dual controls. The position for the navigator and the wireless compartment is behind and below the cockpit. To the rear of this, below the wing, is the passenger cabin which may be arranged to accommo-

date from ten to fifteen passengers. Behind the cabin is a lavatory and a baggage compartment.

Four Gnôme-Rhône K.7d radial engines of 370 h.p. each are mounted in two nacelles above the wing, where the metal airscrews are well clear of the spray. In place of the four K.7's, two Gnôme-Rhône 14K. engines may be used, when the boat is known as the type 24-3, and a top speed of nearly 175 m.p.h. is obtained. The machine flies easily with one engine stopped.

THE LIORÉ ET OLIVIER 24-2

Span	91 ft. 10 in. (28 m)
Length	60 ft. 6 in. (18.45 m)
Height	20 ft. 0 in. (6.10 m)
Wing area	1,237 sq. ft. (116 m ²)
Weight empty	10,330 lb. (4 685 kg)
Disposable load	4,818 lb. (2 185 kg)
Gross weight	18,522 lb. (8 400 kg)
Wing loading	14.8 lb./sq. ft. (72.4 kg/m ²)
Power loading	13.2 lb./h.p. (6 kg/h.p.)
Max. speed (ground level)	137.3 m.p.h. (221 km/hr.)
Climb to 9,840 ft. (3 000 m)	18 min.
Take off	16 sec.
Range	620 miles (1 000 km)

A SPEED-UP ON THE EMPIRE AIR ROUTES

FOLLOWING the policy of gradual acceleration which has already brought India within six days of London, and Cape Town within ten days, Imperial Airways will institute, during April, a further speed-up on the Empire air routes. These will have the effect of reducing the time schedule from England to India to five days, to Singapore to eight days, and to Cape Town to nine days.

On the route to India and the East, by the existing time-tables, the air service leaving London each Saturday reaches Brindisi on Monday morning and Athens on Monday night. By Tuesday it is at Gaza, and on Wednesday evening at Basra. Thursday's stage takes it to Sharjah, and on Friday it is at Jodhpur, Calcutta being reached on Saturday, Rangoon on Sunday, Alor Star on Monday, and Singapore on Tuesday, 9½ days after leaving London.

By the new accelerated schedules on the Indian and Eastern routes, which come into operation with the service from London on Saturday, April 14, Brindisi will be reached very early on Monday morning, after which a speed-up on the flying-boat sections will enable the Mediterranean to be crossed in one day instead of in two, the night halt at Athens being eliminated and Cairo being reached on Monday evening, instead of on Tuesday. Continuing on by the quickened schedule, Baghdad will be reached on Tuesday, and by Wednesday the air mail will have reached Sharjah. On Thursday the stage will be to Jodhpur, and on Friday to Calcutta; after which there will be a speed-up on the Calcutta-Singapore stages, these being accomplished in two days instead of in 2½ days, Rangoon being reached on Saturday and Singapore on Sunday—eight days after leaving London.

Accelerations in the reverse direction, from Singapore to London, will begin with the departure from Singapore on Sunday, April 15. This service will be due in London eight days later, on Monday, April 23, and thereafter the weekly arrival at Croydon of the air mail from India and the East will be changed regularly to Monday instead of Wednesday.

The speed-up on the air mail from England to South Africa begins with the departure from London on Wednesday, April 11, the Mediterranean stages being accomplished—as in the case of the accelerated service to India and the East—in one day instead of in two. Cairo will be reached on Friday, and Khartoum on Saturday, and on Monday—only five days after leaving London—passengers will be at Nairobi, in the heart of the African big-game country. After which this accelerated service will reach Cape Town on Friday, April 20, nine days after leaving London, instead of in the ten days of the existing schedule.

The first accelerated service from South Africa will be that which leaves Cape Town on Tuesday, April 10, and is due in London on Thursday, April 19, and the arrival of the African air mail at Croydon on Thursday each week, instead of on Saturday, will be a feature of the schedules thenceforth.

To cope with the continued growth of traffic along the Africa route, a duplicated service is to be operated regularly over the sections between Salisbury and Johannesburg, commencing with the service northbound on Saturday, April 7, and that flying southward on Tuesday, April 10.

AIR SERVICES IN EGYPT

ON February 15 the first Misr-Airwork service between Egypt and Palestine was operated with a full load of passengers. The aircraft, piloted by Capt. H. Spooner, called at Gaza, Jericho for Jerusalem, and Haifa, and returned the same day. This first service experienced extremely squally weather on the eastbound trip, and westbound it met one of the worst sandstorms known this winter. Visibility at Almaza Aerodrome prior to the arrival of the service was so bad that it was quite impossible to see across the aerodrome to the boundary lights. On this particular day the weather was so bad at Haifa that the R.M.S. *Aquitania* was unable to land and to take off passengers. This service permits letters to be posted on the mornings of Mondays and Thursdays up to 12 noon for unregistered and 11.30 a.m. for registered letters at Haifa, and up to the same times at Jerusalem. The machine arrives at Almaza at 5.30 p.m. on the same day.

The Alexandria service has been running to capacity for some time past, and the Upper Egypt service still continues to be extremely popular, even although the season is drawing to a close.

Amongst the passengers carried on the regular services may be mentioned the following, who have travelled on Misr-Airwork Air Lines in the last two weeks of February:—Lord and Lady Parmoor, Prince de Horthy, who is the son of the Regent of Hungary, Lord Douglas Hamilton, Lord and Lady Salston, the Hon. Mrs. Brock, H.E. Talaat Harb Pasha, H.E. El Barazi Bey and Mme. Barazi Bey, Dr. Fouad Bey Sultan, Kilada Antoun Bey, A. Khayat Bey, Hussein Bey Farid, El Nadouri Bey, Count Selim Saab, Sir Quinteen Brand, Daramalli Bey, Henn Bey, Baron Phylfer, H.H. Prince Osman Fouad, El Messiri Bey, Delawor Bey, Count Shedid and Baron Empain. H.E. the High Commissioner took a large party to shoot at Ikyad on Saturday, February 24, chartering one "Dragon" and one "Fox Moth" aircraft to convey his guests. On February 22 Baron Empain chartered a machine to bring himself and his party from Luxor to Cairo. On February 24 *The Times* chartered a machine, and several flights were made that week for the purpose of taking aerial photographs of Cairo.

DEUTSCHE LUFT HANSA IN 1933

DURING 1933 the machines of D.L.H. carried 94,872 passengers, 1,042 tons of freight and 429 tons of air mail. In comparison with corresponding figures for 1932, the number of passenger miles has increased by 52 per cent., freight by 13 per cent. and mail by 33 per cent. About 5,500,000 miles were covered during 1933, compared with

4,800,000 miles during the previous year. Regarding the increased activities in the carriage of freight, 80 per cent. of the goods carried were for foreign destinations. The extensive development of night mail services accounts for the increase in the amount of postal matter carried. Other factors which have helped in attaining these most satisfactory figures are the assistance of the German Air Ministry, the operation of services throughout the winter, the co-operation of the German Railways and the use of large, fast transport aircraft of the Junkers Ju52-3m type. It is an interesting fact that the number of passengers carried on D.L.H. services during 1933 is equivalent to one-fifth of the number carried on the whole of the airlines operating in the U.S.A. during the same period.

JERSEY AIRWAYS EXTENSION

WE are informed by Jersey Airways, Ltd., that their Portsmouth-Jersey service is being extended to Southampton (Atlantic Park aerodrome). This extension will take effect on Sunday, March 18, and will be run for a test period before deciding whether the traffic warrants running separate machines from both places. At present customs will be cleared at Portsmouth.

THE MANCHURIAN AVIATION COMPANY

DURING 1933 the Manchurian Aviation Co., Ltd., carried more than 16,000 passengers and its machines flew a total distance of 1,677,780 miles (2 700 000 km) in about 18,000 flying hours. Freight carried 529,200 lb. (240 000 kg) and mail carried 141,120 lb. (64 000 kg).

K.L.M. GOES PEDAGOGIC

ON May 1 K.L.M. will put into service a machine specially equipped for aerial geography lessons. An expert will explain through a loudspeaker to the pupils the geographical features of the earth below.

MILAN-TURIN SERVICE RESUMED

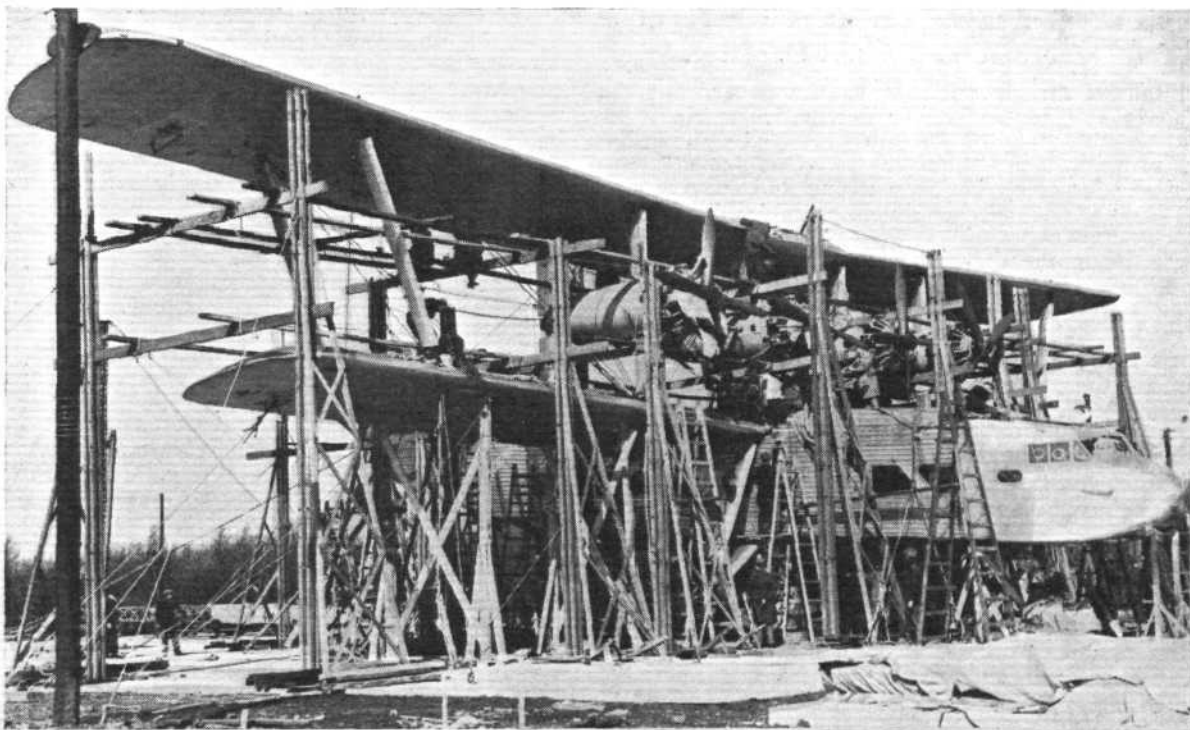
OPERATION of the Milan-Turin air service, which was suspended during the winter months, has been resumed by the S.A. Avio Linee Italiane.

SABENA SPRING SERVICES

THE following are the spring services to be operated by Sabena:—(1) From March 1 to April 30, 1934, Antwerp-Brussels-Berlin, London-Brussels and Brussels-Cologne; (2) from April 3 to 30, 1934, the night mail service over the Brussels-Cologne route (with departures from Brussels at 22.35 from April 3-7 and at 23.35 from April 9-30, and departures from Cologne at 3.10 from April 4-8 and at 4.10 from April 10-30).

BRINDISI-RHODES-ALEXANDRIA

STARTING on May 1, an Italian service will be operated between Brindisi and Rhodes to connect with a fast steamship service between Rhodes and Alexandria.



TAKING SHAPE: The Short "Scylla" (four Bristol "Jupiters") being erected in the open at the Rochester aerodrome. The boisterous weather during the last week or two has interfered greatly with the work, but it is expected that the machine will make its first flight this week.

(FLIGHT Photo.)

SPEED AND THE ECONOMICS OF AIR TRANSPORT

By MAJOR F. M. GREEN

(A résumé of the discussion which followed the lecture delivered before the Royal Aeronautical Society on March 1 and published in an abridged form in FLIGHT for March 8).

MR. H. TIZARD (chairman of the Aeronautical Research Committee) presided at the lecture, and was supported by Mr. F. Handley Page (Vice-President of the Institute of Transport), the meeting being a joint one with the Institute of Transport.

In opening the discussion, the chairman said that Major Green's conclusions were very provocative and warranted careful criticism and examination. He referred, in particular, to the conclusion that, even doing as well as one could in the way of design, the economic speed of an aeroplane lay between 130 and 140 m.p.h.

MR. G. E. WOODS HUMPHREY, Managing Director of Imperial Airways, felt that Major Green was to be congratulated for having solved so easily all the problems of air transport. At the same time there were many vital variables controlling the cost of air transportation which Major Green appeared to have dismissed in an easy manner. Mr. Woods Humphrey assured the lecturer—not from theoretical deduction or hypothetical assumptions, but from fact and experience—that the speed at which goods could be carried at the cheapest possible rate per ton mile was much below 130 m.p.h. The speed given by Major Green's formula, 130 m.p.h., was however somewhere near that which would enable the operator to sell the largest amount of ton-miles. Mr. Woods Humphrey knew this from purely commercial experience, and was therefore at a loss to understand how Major Green arrived at it from aerodynamical calculations. He thought the answer lay in the dismissal of vital matters like fuel and oil, and thus found himself unable to agree with Major Green's basic assumptions.

MAJOR GREEN thought that his paper had been misunderstood, and countered Mr. Woods Humphrey by pointing out that the aircraft he used had a higher drag than 25 lb. per 1,000 lb. weight, at 100 m.p.h., and so their economic speed was not 130 m.p.h. He denied dismissal of the fuel and oil question, as horsepower was taken into account and 130 m.p.h. was the speed which would give the best petrol consumption figures.

MR. WOODS HUMPHREY referred to the words of the paper which stated that the cost of fuel was not of much importance.

MAJOR GREEN replied that it was not of much importance in his analysis, as the amount of petrol used at 130 m.p.h. was about the minimum.

MAJOR R. H. MAYO (Technical Advisor to Imperial Airways) offered serious criticism to the paper, but did not do so in any contentious or destructive spirit. He did not agree with many of the statements and assumptions in the paper. The "Factor of Usefulness" was fundamentally incorrect, basically wrong and entirely misleading. It did not get within measurable distance of representing the ratio of earning capacity to running costs. Discussing the denominator of the fraction, which was made up of "standing charges," and "running costs," he agreed that standing charges depended largely on the gross weight of the aircraft, although both aerodrome charges and general office and traffic expenses depended on the number of journeys made, *i.e.*, the cruising speed of the aircraft. The assumption that aircraft structure and aircraft engines cost the same per lb. was too rough an approximation. Major Green's conclusion that running costs were proportional to the gross weight of the aircraft was amazing, and was reached by skating lightly over most of the major problems of air transport. Major Mayo took the six items used by Major Green in compiling the running costs, separately:—(1) Fuel and oil was not proportional to gross weight but to cruising power. (2) The upkeep of aircraft, being largely dependent on the wear and tear during taking off, landing and taxiing, was also dependent on cruising speed and not only on the gross weight. (3) Upkeep of engines bore no relationship to the gross weight of the aircraft, but depended on cruising power and also on cruising speed, as the heaviest wear and tear occurred during take-off and initial climb. (4) Inspection was, like the last two items, equally dependent on cruising speed. (5) Wages of the

crew were partly dependent on the gross weight and partly on the number of passengers carried. (6) Part of insurance he agreed was roughly proportional to gross weight.

On the subject of fuel and oil, Major Mayo had a good deal to say, and basing his figures on those applicable to the British Imperial routes, he found that increasing cruising speed from 100 to 130 m.p.h. meant an average increase in total operating costs of approximately 20 per cent. Discussing the formula, and in particular that part of the speed range which, by virtue of Major Green's arbitrary assumption as to the power required for taking off, was most favourable to it, correcting this formula by taking into account the cost of fuel and oil and the items which were dependent on cruising speed; Major Mayo said that the "Factor of Usefulness" was shown to be entirely misleading. He felt that there was no short cut to appraising the commercial value of a transport aircraft in the way Major Green suggested. The "Factor of Usefulness" might be of academic value, but did not represent the ratio of earning capacity to running costs, was not a criterion of the commercial value of an aircraft, and was not in reality a factor of usefulness at all. In no form of transport could the commercial usefulness of the vehicle be assessed by such a simple process. There was no such thing as an economical cruising speed in the sense that flying at any particular cruising speed could make air transport pay. The factor which most controlled the commercially economic speed was competition, and the transport operator must supply the public with the speed at which it was prepared to travel, and for which it was prepared to pay. Imperial Airways were often criticised for the comparatively modest cruising speed of their aircraft, but they were one of few important transport organisations in the world which had seriously faced up to the problem of making air transport pay. Major Green's optimum figure of 130 m.p.h. was an arbitrary one determined by the assumptions made in regard to power required for taking off. In conclusion, he believed that the commercially feasible cruising speeds would rise considerably above 130 m.p.h. in the future.

MAJOR GREEN said he had hoped to get Imperial Airways to come out, and they had done so in a magnificent manner. Now that we knew that the cost of petrol represented from 25 to 30 per cent. of the total cost of operation, it was a comparatively simple matter to find out the cost of operating an aircraft, and he was delighted it was so easy. He said that he was merely putting forward a method and not attempting to give a precise answer, and he did not think it was necessary for Imperial Airways to defend themselves for not having flown their machines at 130 m.p.h., because having regard to the parasite drag of their machines they were flying at about the speed he would expect, and he was trying to persuade Imperial Airways, and other operators, of the importance of reducing parasite drag. He did not think the cost of upkeep varied appreciably with the number of take-offs, and, with regard to the horsepower per lb. required for take-off, there were very few aeroplanes flying with less than he had suggested. He intimated that he would reply to the other criticisms in greater detail in a written communication (Major Green refers to the full report which will appear in due course in the Journal of the Royal Aeronautical Society.—ED.), and no doubt he would be able to explain more clearly the precise purpose of the paper.

The **CHAIRMAN** felt that Major Green had been rather misunderstood. His reasoning had real scientific interest to the Aeronautical Research Committee, and, while he did not pretend that the economics of air transport or any transport could be represented by a simple mathematical curve, the paper had done a lot of good in provoking some critical remarks. He hoped that Major Mayo would deal in detail with the conclusion that there must be a speed at which there would be the greatest difference between running costs and receipts if a definite amount were charged per ton mile, and also show how far costs were proportional to gross weight and how far to cruising speed. He appealed to all concerned to study the problem seriously, to find out whether it was possible

to arrive at some sort of guide for the future. Major Mayo, he said, had suggested that there were so many factors that one could not really arrive at a guide, whereas Major Green had said that one could arrive at a guide. As a scientific man he would like the matter put more clearly.

MR. W. O. MANNING deduced from the formula that a reduction of about 0.002 per cent. on the payload was equivalent to an increase of 1 m.p.h. in speed. He asked if that was really the case and whether an increase in speed was not more important than that. He also wanted to know whether it was possible, as the result of experience, to find a formula expressing the economical speed for the operation of buses, ships, railway trains and other forms of transport?

MAJOR GREEN emphasised again that he was not attempting to indicate the right speed at which aircraft should fly, he was endeavouring to find the most economic speed of flying, neglecting altogether the convenience of passengers. He did not say that 130 m.p.h. was right or wrong. It was merely a speed at which he had arrived, and he was interested in deducing a method which had given that result. If that method were wrong, or too approximate, it was of little value, and that was the spirit in which he hoped the paper would be accepted.

COMMERCIAL AIRWAYS (ESSEX), LTD.

THIS company, which operates from Loughton Aerodrome, Abridge, Essex (Telephone: Theydon Bois 224), intends to operate before the end of this month a service from London to Glasgow, via Leeds, Bradford, Newcastle and Edinburgh. The service will be run daily, starting from King's Cross at 8.30 a.m. and arriving back in London at 6 p.m. Details are given in the following table:—

DEPARTURES		ARRIVALS	
Abridge	9.00 a.m.	Leeds	10.10 a.m.
Leeds	10.15 a.m.	Newcastle	10.55 a.m.
Newcastle	11.00 a.m.	Edinburgh	11.50 a.m.
Edinburgh	11.50 a.m.	Glasgow	12.15 a.m.
Glasgow	2.15 p.m.	Edinburgh	2.35 p.m.
Edinburgh	2.40 p.m.	Newcastle	3.35 p.m.
Newcastle	3.35 p.m.	Leeds	4.15 p.m.
Leeds	4.20 p.m.	Abridge	5.25 p.m.
Abridge	5.30 p.m.	King's cross	6.00 p.m.

Cars leave King's Cross 8.30 a.m. for Abridge Aerodrome.

Single Fares.—London to Leeds, £2 10s.; London to Newcastle, £3 19s.; London to Edinburgh, £5 15s.; London to Glasgow, £6 5s.; Glasgow to Edinburgh, 15s.; Newcastle to Glasgow, £2 10s.; Newcastle to Edinburgh, £1 16s.; Leeds to Newcastle, £1 9s. 6d.; Leeds to Edinburgh, £3 5s.; Leeds to Glasgow, £3 15s.

It is the intention of the company, directly this service is under way, to start another service, between London, Leicester, Derby, Manchester and return. Yet another service, Hull, Manchester, Liverpool and return is contemplated. It is hoped to connect this with the Continental services at Hull and other points.

On these services 15 lb. of luggage per passenger will be allowed free. Heavy luggage may be carried separately at 1d. per lb. per 100 miles. Children in arms are carried free, and children over three and under seven at half the standard fare.

Airspeed "Courier" six-seaters cruising at nearly 150 m.p.h. will be used.

MR. HANDLEY PAGE proposed a vote of thanks to Major Green, and in doing so evidently assumed that a reduction of parasitic drag was to be accompanied with a decrease in the comfort enjoyed by the passengers, as he said that apparently parasitic drag was the sole criterion by which aeroplanes were to be compared, and he thought that it was of no interest to a passenger, sitting in extreme discomfort and having to bear a lot of noise from the engines, to be informed, by means of an excellently illustrated pamphlet—he could not be told by word of mouth because he would not be able to hear what was said—that the parasitic drag of the aircraft in which he was travelling was only 25 lb. "per 100 miles" or something of that sort. Major Green had, he suggested, endeavoured to provide a "yard stick" by which one might compare aircraft. It would be generally agreed that the paper had performed an excellent service, in that it had acted as a piece of cheese to draw the mice who were previously afraid to come out into the open, and they had proved somewhat vociferous. In conclusion, he commended to the notice of members the fact that the Institute of Transport had, owing to the generosity of the Bristol Company, a gold medal to be awarded each year for the best paper on civil aviation.

THE EQUIPMENT OF AIR-FRANCE

OF the ten Lioré et Olivier 21's in service with Air-France, eight "Golden Rays" have been sold to the French Air Force. The two remaining machines will be used only for freight transport. Consequently the eight Wibaults now in operation will have to work very hard on the London-Paris, Paris-Bucharest, Paris-Marseilles, Paris-Berlin, Paris-Malmö and Paris-Brussels services. Until the six new Wibaults which are on order have been put into service, the machines now in commission will have to fly between 100 and 150 hours per month.

A "WESSEX" FOR RHODESIA

A WESTLAND "Wessex" belonging to Imperial Airways has been transferred to Salisbury where it will be used by Rhodesian & Nyasaland Airways. Up to the present "Puss Moth" aircraft have been used, but the demand for increased passenger accommodation has necessitated the provision of larger machines.

BOEINGS FOR D.L.H.

THREE Boeing 247 passenger machines have been shipped from New York for Germany, where they will be delivered to Deutsche Luft Hansa for experimental work.

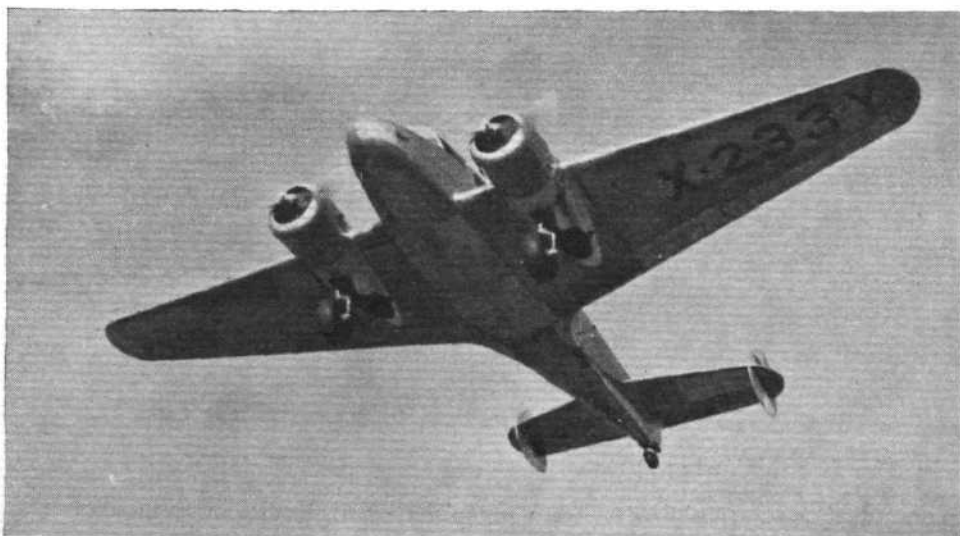
A NEW VICE-PRESIDENT FOR AIR-FRANCE

M. HENRI BOUCHÉ, Editor of our contemporary *L'Aéronautique*, and who, since the inception of Air-France, has been a member of the Board of Directors, has been appointed Vice-President of that company.

A SHANGHAI-MOSCOW SERVICE

BEFORE the close of the year the China National Aviation Corporation hopes to establish a four-day air service from Shanghai to Lhasa, Tibet. Under existing conditions the journey takes three months. It is probable that the new route is projected towards Kazam and Moscow via Tashkent, Tschelkar and Akyubinsk. A 45 per cent.

interest in the company is held by Pan-American Airways and American pilots and equipment are employed. The company desires to extend its activities down as far as Hong Kong, which, it seems, will soon be a port of call for Air-France.



IN FULL FLIGHT: The Lockheed "Electra" makes its maiden flight at Burbank, California, on February 23. A description of this machine was published in "Flight" for January 25 last.

From the Clubs.

HATFIELD

Mr. Christiansen, a Norwegian member of the London Aeroplane Club, who is taking his "B" licence, completed his first solo after 8 hours' dual. On Friday Mr. Short completed his "A" tests, and Mr. Cochran made his first solo flight. Both are members of the de Havilland Technical School. Mr. Harris, the chief instructor, is away for a short time, undergoing an operation. All will wish him a speedy recovery. Flt. Lt. H. W. G. Selby-Lowndes has recently joined the instructional staff. He has 1,800 hours' flying to his credit, and has been an instructor at the C.F.S. at Wittering.

The Hatfield Squash Rackets Team received its first defeat on Wednesday last at the hands of the Hadley Wood team, which won by 3 games to 2. Hatfield was represented by Major Newnham, and Messrs. Thomas, Burn, Roberts and King.

Two new members joined the London Aeroplane Club during the week, Messrs. Fahmy and Bassili.

Flying times for the week were:—London Aeroplane Club, 77 hr. ; R.A.F. Reserve Flying Club, 7 hr. 25 min. ; Stage and Screen Aero Club, 2 hr. 25 min.

BROOKLANDS

Last week the weather was very favourable for school work, although rather rough for *ab initio* landings. The total hours for February were 245, and for the past week 75 hours, of which 29 hours were dual and 46 hours solo. "B" licence tests were carried out by Messrs. Anderson, Harrison, Hordern, and Opie, and "A" tests by Fotheringham and Hall. New members who joined during the week were: Hector, Fornby, Walker and Miss Gore. Early morning flying has been very popular during the week. Cross-country flights were made to Southampton, Lympne, Cambridge, Norwich, Birmingham, Bristol and York. The sales department delivered a "Leopard Moth" to Gatwick, and two second-hand machines have also been disposed of. Visiting pilots are reminded that there is now no landing fee at Brooklands on race days.

HANWORTH

Flying on Club aircraft amounted, for the week ending March 9, to 29 hours. Mr. Kirwan completed his tests for "B" licence, and Mr. Falk obtained his "A" licence. On Thursday Mr. G. W. Harben returned in his "Puss Moth" from a fortnight's tour in France and Germany. On March 24 there will be a dinner and dance at the Club.

NORFOLK AND NORWICH

During last week Mr. Ketton-Cremer received instruction from Mr. Collier, and Lady Hare, Miss Hudd and Mr. Smith took refresher courses with the instructor. Soloists were Miss Hudd, Messrs. Kirkby, Ketton-Cremer and Sqd. Ldr. Buxton.

At 8 p.m. on Friday, March 22, a lantern lecture is being given in the club-house under the auspices of the Club and the Norfolk and Norwich Archaeological Society.

During the past summer the Club took many photographs from the air of archaeological sites in the county, and these will be shown for the first time, with a running commentary by Professor D. Atkinson, F.S.A. The lecture will be preceded by a demonstration by Capt. A. A. Rice, M.C., of the methods used in air photography.

Another supper dance will be held at the Club at 8.30 p.m. on Friday, April 6. Wally Drane's Follies Band will play.

Public Schools' Camp

For a duration of four to five weeks, commencing August 9 this year, a Public Schools Aviation Camp is being organised by the Norfolk and Norwich Aero Club at Mousehold Aerodrome, Norwich. The camp will be under canvas and under the direct supervision of a public school-master who has a wide knowledge of boys' camps and who is an experienced pilot. Attendance at the camp affords full privileges of the club membership for the period and involves an obligation to observe the club rules. Ground instruction will be given on all the subjects necessary for passing the Air Ministry's examination for "A" pilot's licence. Dual flying instruction will be given and a fee of £30 will include four to five weeks' in the camp (£9 5s.), nine hours' dual instruction at 35s. per hour (£15 15s.), three hours' solo at 30s. per hour (£4 10s.), and extra flying time (10s.). This should enable the average man to go solo and to gain his "A" licence. No pupil is allowed to go solo under six hours. Where the flying time falls short of that specified, a rebate will be allowed at the above rates and additional flying will be charged at the rate of 35s. per hour for dual and 27s. 6d. for solo. Candidates for the camp must be 17 years of age before September 30, 1934, and the latest date of entry is June 1. Membership of the camp will be limited to 30 pupils. Early application is therefore advisable. Naturally it cannot be guaranteed that each member of the camp will obtain an "A" licence, but every effort will be made to help him to do so. The club has issued a very comprehensive book giving full information about this scheme, and those who are interested should write to the Secretary, Norfolk and Norwich Aero Club, Norwich, or to H. Birchall, Taunton School, Taunton.

CINQUE PORTS FLYING CLUB

During the week ending March 10, 23 hours 50 minutes were put in owing to the improved weather. Mr. Bailey made a first solo, and several members who had temporarily stopped flying because of the cold have started again. New pupils include Mr. Parker from the Small Arms School, and Mr. Ford Junr. had a trial lesson; he is the son of Councillor Ford, of Hastings, who is a strong supporter of the new Municipal Airport. Mr. Murray Smith was flown to Wittering on March 9 by Mr. Waller, who returned via Sywell to pay a call on the affiliated Club. Mr. Fisher made a "flying" visit to North Wales during his few days leave before returning to India, where he does



A JAPANESE LIGHT PLANE: The Itoh high-wing 2-seater monoplane, constructed by the Itoh Aeroplane Factory of Chiba, near Tokio, and equipped with a 40 h.p. British Salmson engine. It is used by the Japan Light Plane Club, an unsubsidised concern organised by a pioneer of Japanese aviation, Baron Narebara.

enty of flying at Dum-Dum. Mr. Webb, who only joined Club last week, is making remarkable progress and is most ready for solo. Mr. Gogte is continuing his night ing, and during the day Mr. Brown instructs him in and flying. G-ABAO having been lent to the Club by ooklands for a few days, many members are taking vantage of trying their hand at blind flying, and shortly is to be hoped that a course in this will be a further dition to the Club's progressive movement.

READING AERO CLUB

The school machines put in 30 hr. flying during the past week. New pupils are Messrs. Boyd, Holland and Ritchie, and new "A" licence holders Messrs. Craig, Gill and Burke. Monday was a particularly busy day; at lunch time there were 14 aircraft outside the clubhouse, including six "Moths," one "Spartan," one "Fox Moth," one "Martlet," three Miles "Hawks," one "Puss Moth" and Klemm. Private owners visited Hendon, Hanworth and Brooklands. Visitors included Com. Perrin, of the Royal Aero Club, Messrs. Ramsay, Scholes, Parsons and Mrs. Barnes, who took delivery of her "Cirrus III.A Hawk." Mr. G. H. Atkinson, an old kite balloon observer of the Royal Flying Corps, has renewed his acquaintance with flying by joining the club. The annual general meeting of the club took place on Sunday, March 11, at 6.15 p.m., followed by an informal dinner.

THE HAMPSHIRE AEROPLANE CLUB

During the year 1933 a total of 1,824 hr. 50 min. was flown on club aircraft, an increase of 212 hours on the total for 1932. Early in the year the club purchased a "Gipsy Moth," which brought the total number of machines to four, three "Moths" and one "Gipsy II" three-seater "Spartan." During the year 8,294 persons were carried in club machines, and 5,366 separate flights were made. Fifty-one new pilot members joined the club and 13 people became temporary members. "A" licences obtained numbered 35, and 34 renewals. "Dawn Patrols" were undertaken during the summer months to Brooklands, Bristol, Reading and Broxbourne, the four club aircraft taking part in each "patrol." Cross-country flights of 30 miles and over numbered 101. In August the club had the pleasure of welcoming back their President, Lord Louis Mountbatten, who came back to renew his "A" licence. During the winter months a series of lectures on map reading, navigation, and compass reading were given in the clubhouse by the instructors. The annual dinner and dance was held on December 1 and attended by 189 persons, including Lady Bailey, Col. and Mrs. Sheldermine, Sir Alliot and Lady Verdon-Roe and Col. and Mrs. L. A. Strange. The Silver Moth Landing Trophy was competed for three times and won by Messrs. Matthews, Waite and Johnstone.

YORKSHIRE AEROPLANE CLUB

Including a flight to Hooton and back, the flying hours during last week totalled 8. A new member is Mr. F. Wallace, of Leeds. Visitors during the week included ABCT, ACBX, ABVU, and ACAW. An enjoyable dance was held at the club-house on March 3.

HULL AERO CLUB

The future of the Hull Aero Club has at last been definitely settled. It is proposed to form the club into a Limited Liability Company, the connection with National Flying Services to be discontinued. This has been made practicable by an agreement with the Corporation, and it is felt there is no reason why every prospect of success should not be expected provided the requisite financial assistance is given by all members. It is proposed to issue £1 membership shares (fully paid) in the new Hull Aero Club Company to members, and they are asked to take as many as they can possibly afford. The club ask for, and must have, enthusiasm, activity and help, financial, practical and theoretical. The following fixtures have been arranged at Hedon during the month. Saturday, March 24, is a Club night. On Thursday, March 22, Maj. F. A. de V. Robertson, of FLIGHT, will give a lecture on "The Royal Air Force," illustrated by lantern slides. On Sunday, March 25, a very novel competition will be held, full particulars of which can be obtained at the clubhouse. The new flying rates operating at Hedon as from March 6 are as follow:—Dual instruction, £2 an hour; solo instruction, £2 an hour; solo flying up to 25 hours, 35s. an hour, after 25 hours 30s. an hour; hangar accommodation, £2 a month, excluding maintenance; private lock-ups, £1 a month; Air Ministry rates for housing and repairs 3s. an hour, plus materials.

LANCASHIRE AERO CLUB

The club's flying times for the week ending March 3 totalled 25 hr. Mr. Douglas Fairweather, a club member, flew from Glasgow to Paris, by way of Woodford, and returned in his own Avro "Cadet," and Mr. Cohen increased the airmindedness of his family by taking them all into the air at once—his wife, fourteen months old baby daughter and Cairn terrier!

CARDIFF AEROPLANE CLUB

From March 6 to March 11 inclusive, the flying hours were: Dual, 12 hr. 45 min.; solo, 20 hr. 25 min. Tests, 1 hr. 5 min. Sqd. Ldr. H. L. Nunn has joined the Club as an associate flying member.

MARSHALS FLYING SCHOOL AT CAMBRIDGE

Flying for week ending March 11 included 15 hr. dual and 12.20 hr. solo. Two new members, Mrs. W. Crossley and Mr. J. Lawes, joined the school. Mr. R. W. Guatrey completed tests for his "A" licence and Mr. H. R. Dimmock made a first solo flight. Visiting machines included a "Monospar" flown by Mr. C. Gardner, a "Gull" flown by Mr. Lorenbriage and a Comper "Swift" flown by Mr. Symington, besides which there were several cross-country and air taxi trips made to Cheltenham, Oxford, Reading, Hatfield and Birmingham.

LIVERPOOL AND DISTRICT AERO CLUB

During the week ending March 9 the Liverpool and District Aero Club at Hooton Park did 49 hr. 15 min. flying. This was made up of 21 hr. 45 min. dual instruction, 25 hr. 25 min. solo flying and 2 hr. 5 min. night flying.

LONDON GLIDING CLUB

Strong favourable winds on Saturday and Sunday, March 3 and 4, enabled the club to put in 21 hours of soaring with eight machines, the "Kassel 20" and "Kassel two-seater," "Professor," "Prüfling," "Crested and Willow Wrens," "Scud II" and "Hols der Teufel." About 27 passengers were carried in the two-seater, which reached a maximum height of 900 ft. above the hill. The "Crested Wren" reached 950 ft. Five machines were frequently in the air together.

On Saturday the wind blew fair up the hill. With the sun shining brilliantly, pilots were able to circle in passing thermal up-currents. On Sunday the sky was overcast and the wind oblique to the ridge. Conditions were sufficiently rough, with occasional light rain, but were extremely interesting, the process of building up a maximum height of 600 ft. being delicate. Two of the club's pilots have now done 150 hours of soaring between them.

AVIATION SCHOOL IN RANGOON

The opening of an aviation training school in Rangoon is under contemplation. A full course for the pilot's "A" licence will be provided. The authorities of U. P. D. Han & Co., Rangoon, are sponsoring the movement, and will employ Government certified pilots and ground engineers as instructors provided a sufficient number of applicants signify their intention of undergoing a course.

BENGAL FLYING CLUB

A total of 63 hr. dual and 51 hr. 20 min. solo flying was recorded for the month of January. First dual instruction was given to Mrs. I. M. Bell, Messrs. A. C. Baxter and Joygopal Mookerjee, and successful first solos were done by Mrs. I. J. Lewis, Messrs. N. T. Chiene, G. W. R. Fitzau, F. Wolff and H. N. Chaudhuri. Mr. N. T. Chiene has carried out and passed all tests for an "A" licence. Club machines and pilots assisted in the relief work for the earthquake area. F/O. K. D. Knocker took one machine to Darbhanga, with the Maharaja's Under-Secretary as passenger, to obtain news concerning the state of things in that district. Maj. Matthews was away for nine days rendering invaluable assistance. Other cross-country flights were done by Messrs. H. I. Matthews, J. G. Woollard, L. Dhawan, A. Mukherjee and Dr. S. G. Galstaun. Places visited included Chandpur, Maheshganj, Dacca and Asansol.

JOHANNESBURG AERONAUTICAL ASSOCIATION

Hours for the week ended February 11 numbered 37 hr. 25 min., of which dual occupied 11 hr. 20 min. One cross-country flight was made by Mr. G. B. D. Williams, who took Mrs. John Stuart and Mr. O. Drew to Saas Post, the farm of the Hon. John Stuart, in Bechuanaland.

At Baragwanath Aerodrome during the week ending February 19, blind flying occupied 10 hr., other flying time totalling 36 hr. 50 min., of which 12 hr. 30 min. was occupied by dual. Mr. H. E. Winder went solo.

THE ROYAL AERO CLUB OF THE UNITED KINGDOM

OFFICIAL NOTICES

Report of the Meeting of the Committee of the Royal Aero Club, held on February 28, 1934.

Present: Lord Gorell, C.B.E., M.C., in the Chair; A. J. A. Wallace Barr; Com. J. Bird, O.B.E.; Flt. Lt. C. Clarkson; Maj. C. J. W. Darwin, D.S.O.; W. Lindsay Everard, M.P.; Maj. A. Goodfellow; J. Lord; Lt. Col. Sir Francis K. McClean, A.F.C.; Lt. Col. J. T. C. Moore-Brabazon, M.C., M.P.; F. Handley Page, C.B.E.; Maj. H. A. Petre, D.S.O., M.C. In attendance, H. E. Perrin, Secretary.

Election of Members.—Engleman Andre, Charles Howard Bolton, Sydney Brown, Charles Harington Groves, Geoffrey Harmsworth, Walter Hill, Harold E. S. Huth, Oscar Trevor Jones, George Alexander Lingham, Albert Hermann Richter, David Gordon Ross, Sydney Lewis Turner.

Aviators' Certificates.—

11,675	John D. T. Revell ..	Hanworth Club (N.F.S.)	19.1.34
11,676	Stanley H. Palmer ..	Portsmouth Ae.C.	21.1.34
11,677	Ambrose H. Milnes ..	London Ae.C.	20.1.34
11,678	John Constant ..	Airwork School of Fl.	23.1.34
11,679	George Huntsman ..	Southend Fl.C.	20.1.34
11,680	Cyril B. Mills ..	London Ae.C.	21.1.34
11,681	Alan S. Simpson ..	Lancashire Ae.C.	21.1.34
11,682	N. M. McLeod Martin ..	Scottish Fl.C.	28.11.33
11,683	James G. Butt-Reed ..	Scottish Fl.C.	21.1.34
11,684	Audrey E. MacMillan ..	Scottish Fl.C.	16.1.34
11,685	John A. Lucas ..	London Ae.C.	26.1.34
11,686	Leong Chong Tat ..	Kuala Lumpur Fl.C.	22.11.33
11,687	Robert R. Duly ..	Portsmouth Ar.C.	27.1.34
11,688	Murzbach Choksey ..	Air Service Training, Ltd.	25.1.34
11,689	Susan S. Tufton ..	Airwork School of Fl.	25.1.34
11,690	Harold L. Armstrong ..	Cardiff Aeroplane Club ..	30.1.34
11,691	Alexander Blair ..	Scottish Flying Club ..	20.1.34
11,692	Cyril P. Fountain ..	Southern Aero Club ..	19.1.34
11,693	Frederick R. Hill ..	Phillips & Powis Fl. School	29.1.34
11,694	Charles E. H. J. Phillips ..	Airwork School of Fl.	31.1.34
11,695	Ronald E. Clear ..	Wiltshire School of Fl.	26.1.34
11,696	William H. Botsford ..	Airwork School of Fl.	31.1.34
11,697	Ian B. D. E. Hay ..	Phillips & Powis Fl. School	28.1.34
11,698	Fred Beeley ..	Kuala Lumpur Fl.C.	30.11.33
11,699	Roy M. Coull ..	Air Service Training, Ltd.	2.2.34
11,700	Rosemary Rees ..	Airwork School of Fl.	3.2.34
11,701	Ronald W. G. Kitley ..	Brooklands Ae.C.	8.2.34
11,702	Valentine M. Coles-Webb ..	Air Service Training, Ltd.	7.2.34
11,703	Ian R. Harper ..	Kuala Lumpur Fl.C.	6.12.33
11,704	Joseph A. Baker ..	London Ae.C.	9.2.34
11,705	John L. C. Coles ..	Hampshire Ae.C.	9.2.34
11,706	Reginald W. Williams ..	Herts & Essex Ae.C.	10.2.34
11,707	Richard G. Trevithick ..	Scottish Fl.C.	4.1.34
11,708	Horace Whitaker, Jr. ..	Surrey Fl. Services, Ltd.	5.2.34
11,709	John M. Purves, Jr. ..	Newcastle Ae.C.	4.2.34
11,710	Philip L. Adamson ..	Hampshire Ae.C.	13.2.34
11,711	Helen M. Barnes ..	Sussex Ae.C.	15.2.34
11,712	Gerald Speight ..	Liverpool & Dist. Ae.C.	15.2.34
11,713	Charles E. Ruscoe ..	Cinque Ports Fl.C.	9.2.34
11,714	James C. Smith ..	Norfolk & Norwich Ae.C.	2.2.34
11,715	Holland S. Duell ..	—	16.2.34
11,716	Winifred M. Crossley ..	Norfolk & Norwich Ae.C.	16.2.34
11,717	Reginald W. Gautrey ..	Marshall's Fl. School ..	18.2.34
11,718	Geoffrey H. Cook ..	—	13.2.34
11,719	Martin V. Williams ..	Bristol & Wessex Ae.C.	20.2.34
11,720	Ralph D. Richardson ..	De Havilland School of Fl.	21.2.34
11,721	Albert Sadler ..	Cotswold Ae.C.	21.2.34
11,722	Percy H. Becker ..	East Anglian Ae.C.	20.2.34
11,723	Loke Yai Foo ..	Kuala Lumpur Fl.C.	28.12.33
11,724	Mervyn S. B. Vernon ..	Airwork School of Fl.	23.2.34
11,725	Lewis Falk ..	Hanworth Club (N.F.S.)	23.2.34
11,726	Hamish MacDonald ..	Air Service Training, Ltd.	21.2.34

Gliding Certificates.—"A": No. 352, Maurice Elliott, Bradford and County, September 10, 1933; No. 353, Robert Henry Somerset, London Gliding Club, February 18,

1934. "B": No. 311, John Maskill Noble, London Gliding Club, February 11, 1934.

Sub-Committees.—The reports from the following Sub-Committees were received and adopted:—House Committee, Finance Committee, Racing Committee.

England to Australia Race.—The following Committee was appointed to carry through the organisation of the Race from England to Australia:—W. Lindsay Everard, M.P., Flt. Lt. C. Clarkson, Lt. Col. M. O. Darby, O.B.E., Maj. A. Goodfellow, Maj. R. H. Mayo, O.B.E. Flt. Lt. T. A. Swinbourne, H. E. Perrin (Secretary).

Britannia Trophy.—The Britannia Trophy for the year 1933 was awarded to Mr. J. A. Mollison for his flight from England to Brazil in February, 1933.

Mr. Mollison, on a D.H. "Puss Moth," fitted with a "Gipsy Major" engine, completed the flight from England to Brazil in 3 days 10 hours 8 minutes.

Segrave Trophy.—Mr. John Lord and Mr. H. E. Perrin (Secretary) were appointed to represent the Royal Aero Club at the meeting of the Awarding Committee, held on March 8, 1934.

Customs Carnets.—Maj. C. J. W. Darwin and H. E. Perrin submitted a report on the Conference in Paris, held on February 5 and 6, 1934, at which they attended on behalf of the Royal Aero Club. The object of the Conference was to establish international regulations for the issue of carnets for aircraft touring abroad, and to consider the new form of carnet submitted by the Aero Club of Poland.

Petrol Tax.—The Committee considered the returns received from the Light Aeroplane Clubs and Aviation Schools of petrol consumed for the year 1933 with a view to investigating the question of obtaining a rebate on the petrol tax used in aircraft.

Lady Membership.—The Committee considered the report of the debate held at the Club on February 20, and decided to take no further action in the matter at present.

ENGLAND TO AUSTRALIA RACE

Meeting of the Committee held on Wednesday, February 28, 1934:—

Present: W. Lindsay Everard, M.P., in the Chair; Flt. Lt. C. Clarkson, Maj. A. Goodfellow, Maj. R. H. Mayo, O.B.E., Air Commodore R. Williams, Flt. Lt. T. A. Swinbourne, Capt. F. Entwistle (Air Ministry). In attendance, H. E. Perrin (Secretary).

Starting Time.—The Committee unanimously decided that the starting time of the Race from England to Australia should be provisionally fixed for 6.30 a.m. on October 20, 1934.

Control Points.—In view of the possibility of Calcutta Aerodrome being rendered unserviceable in October, it was decided to select the aerodrome at Allahabad as the Control Point in India.

Offices: The Royal Aero Club,
119, Piccadilly, London, W.1.
H. E. PERRIN,
Secretary.

King's Cup air race

THE Royal Aero Club announces that the Race for the King's Cup will take place on Friday and Saturday, July 13 and 14, 1934, starting and finishing at Hatfield Aerodrome, Hatfield.

Competitors.—The entrant and pilot or pilots or passengers must be British subjects. The entrant must be an individual and not a company.

Pilots.—Pilots taking part must have flown solo for at least 100 hours prior to May 1, 1934.

Aircraft.—The race is open to any type of *bona fide* civil aircraft. The aircraft, including the engine and the engine accessories, must have been entirely constructed in the British Empire. For the purposes of the race, a *bona fide* civil aircraft is an aircraft which was originally designed

and subsequently constructed for use in civil aviation activities.

The Race.—The race will be flown in four rounds. There will probably be eight heats in the first round, four heats in the second round, two heats in the third or semi-final round and a final. The heats of each round will be flown over the same course, but a different course will be selected for each round. The length of the course for the first and second rounds will be approximately 250 miles each, the third or semi-final round 200 miles and the final 100 miles.

The first and second rounds will be flown on Friday, July 13, and the semi-final and final rounds on Saturday afternoon, July 14, 1934. In addition to the Cup presented by His Majesty the King, prizes amounting to £500 have been received from Lord Wakefield of Hythe.

A NON-FRICTIONAL CONTROL

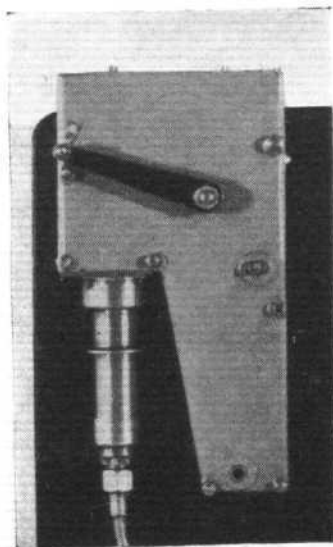
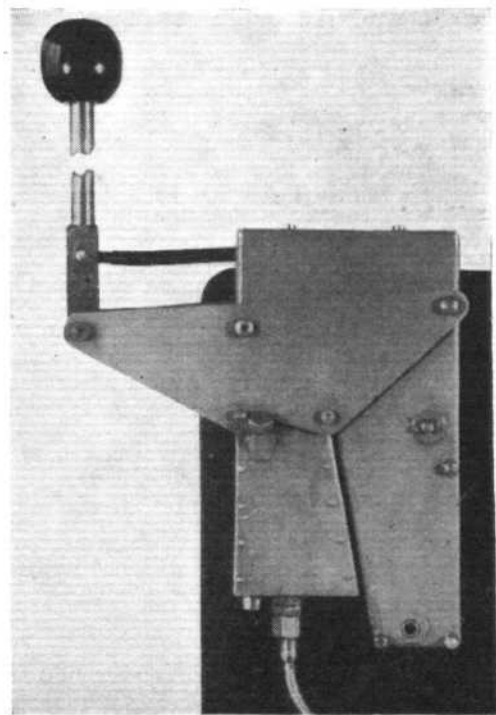
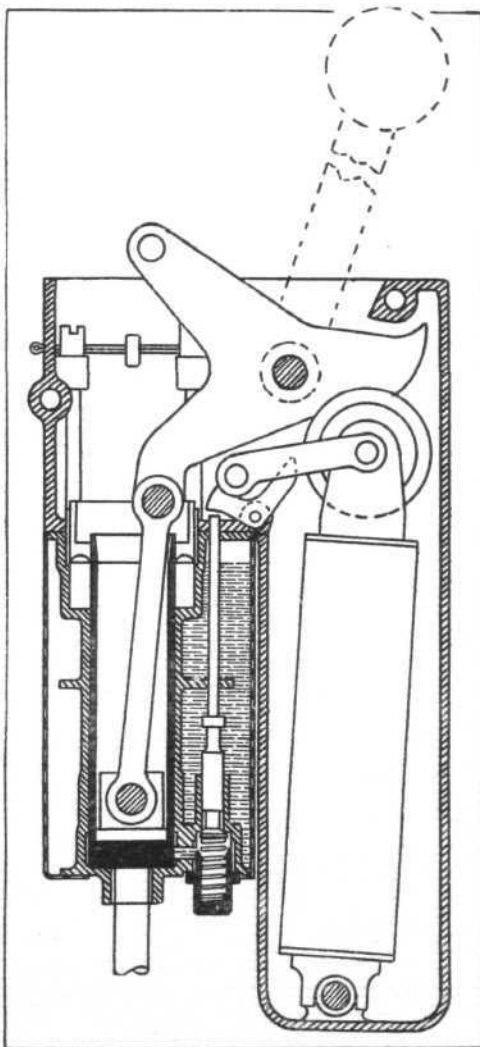
Aircraft designers requiring a light, frictionless control which is easy to instal, requires no maintenance, and has many applications, will be interested in this article

DR. H. S. HELE-SHAW and Mr. T. E. Beacham have designed, and the Exactor Control Co., Ltd., Dorland House, Lower Regent Street, W.1, are marketing, a new form of hydraulic control called the Hele-Shaw-Beacham Hydraulic Tele-Control Gear. This control has already been adopted for operating the engine throttles of certain aircraft and should undoubtedly, in the near future, become very widely used. Its nature makes it particularly suitable for every form of control where exact movement, without any loss whatsoever, is required where weight is important, friction must be obviated, and simplicity of installation is desired. It consists of two control boxes connected by a single small bore copper pipe. As it is, for the present at any rate, in aircraft primarily used for throttle controls, we will deal with it from this point of view, but designers will undoubtedly immediately realise its many other applications. The two boxes are the same in their essentials; our diagram showing a part section through what may be termed the transmitter. As at present arranged, the operating handle is fixed to the actuating lever, but in subsequent models the top lug on this lever is being removed and the handle will operate direct on the fulcrum of the lever. Upon reference to the diagram it will be seen that the control units have a cylinder in which a piston is operated by the throttle lever in the case of the transmitter and which operates the carburetter in the case of the receiver. This piston has a specially designed gland which obviates leakage. There is, however, a compensating mechanism in case leakage takes place either here or anywhere else in the system. The two cylinders are connected by copper piping filled with a non-freezing liquid. Both cylinders are of equal diameter and it follows, therefore, that a movement of one piston will produce an equal and opposite movement of the other piston. The fluid in the system is kept under pressure by a spring which, as can be seen in the diagram, acts at all times directly on the piston. In order that the pressure exerted by these springs should at all times remain constant, regardless of the

position of the pistons, the crank arm to which the throttle lever is fixed extends backwards and forms a cam of varying radius, and working in a grooved roller on the top of the spring plunger. The bottom of this spring plunger housing is mounted on a roller, allowing it to pivot freely. By this means the spring pressure which is applied to the piston through this cam is varied according to the position of the piston, and the load on the piston is therefore kept constant.

As we have already said, the pistons are packed to prevent leakage, but in order to compensate the system and to prevent the pistons getting out of step should leakage occur either here or anywhere else, and also to prevent temperature changes having the same effect, a synchronising device is fitted to the transmitter. In the diagram it will be seen that the cylinder communicates with a small reservoir in the centre of the transmitter through a small spring controlled valve. When the throttle is wide open, a link mechanism also opens this valve against the action of its retaining spring. This relieves any excess pressure in the liquid or, alternatively, provides for replenishment of any loss should there be any. During this operation the spring pressure on the transmitter piston is zero, but the spring pressure is still applied to the piston at the receiving end; this piston will then move to the end of its stroke as the liquid pressure has been released, thus refilling the system. Further movements of the transmitter piston will be followed by exactly equal movements of the piston at the receiving end. This, then, is a brief description

of the system as used for throttle controls. Single pipe controls are now available with a range of angular movement and torque transmissions. Where it is desired to provide for movement, either side of the off position, duplex units are used at each end, and the connection is by means of double piping. The throttle controls have already been installed and tested in service aircraft of the R.A.F. These control units complete, now weigh slightly under $4\frac{1}{2}$ lb. and the piping only 1 lb. per 10 in., as it is no larger than $\frac{1}{4}$ in. outside diameter.



Our diagram shows the inside of the transmitting unit. transmitter and receiver.

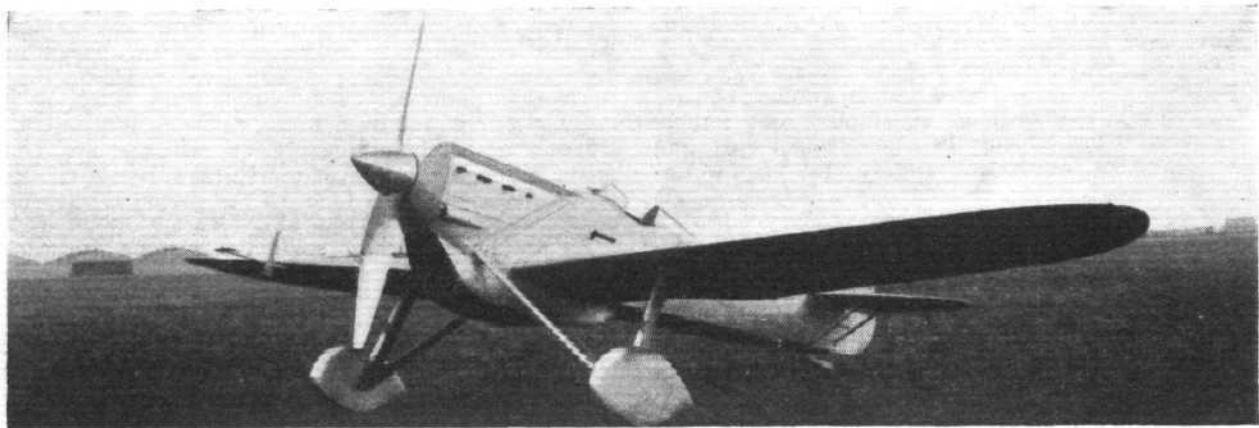
The small photographs are taken from a demonstration (FLIGHT Photos. and Sketch.)

Honorary physician to The King

THE Air Ministry announces that the King has approved of the appointment of Air Commodore Alfred

William Iredell, M.R.C.S., L.R.C.P., as an Honorary Physician to His Majesty, vice Air Commodore Hardy Vesey Wells, C.B.E., M.R.C.S., L.R.C.P., who has vacated the appointment on retirement from the Royal Air Force.

NEW AIRCRAFT



The Dewoitine D.500

AS the outcome of the recent French competition for fighter aircraft, the Air Ministry has ordered 60 Dewoitine D.500 single-seater fighters. One-quarter of the order will be carried out by the Dewoitine works at Toulouse, and the remainder by Lioré et Olivier at Argenteuil, the price per machine being about £3,100. The aircraft is an all-metal low-wing cantilever monoplane, with the wing, which is in three sections, built round a single spar. Ailerons of high aspect ratio extend for nearly the whole length of the wings. The fuselage, which is of oval section, is of typical Dewoitine monocoque construction, employing a number of transverse frames, four longerons and light longitudinal members. Duralumin sheet is used for the covering. The empennage is a duralumin structure with smooth sheet covering.

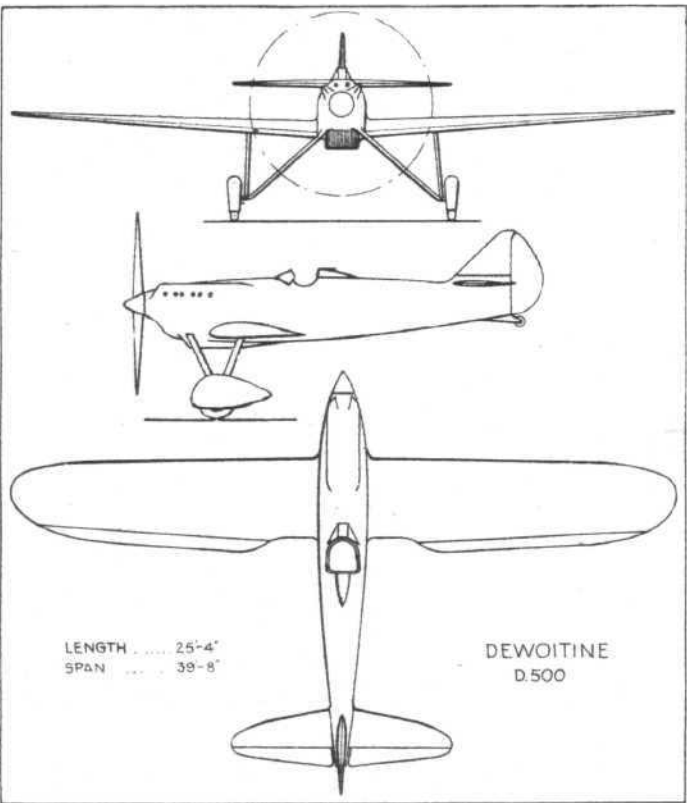
A divided undercarriage of very wide track is used, employing two oleo pneumatic legs and Vee axles. Wheel brakes are fitted, and the wheels are almost entirely enclosed by very neat streamline fairings.

An Hispano Suiza 12 Xrs. geared and supercharged engine giving 600 h.p. at ground level and 650 h.p. at 16,120 ft., is fitted as standard. This engine has an extraordinarily good power weight ratio, its dry weight being 814 lb.

It seems likely that the production D.500's will have ethyl-glycol cooling. The radiator, which is below the engine, is of the tunnel type. Fuel is carried in two main tanks, one on each side of the fuselage in the wings. Both tanks may be dropped during flight.

The pilots' cockpit is over the trailing edge of the wing and is provided with an adjustable seat, oxygen equipment, wireless and two rifle calibre machine guns with interrupter gear.

The Dewoitine D.500 has been developed into the types D.560 and D.570. Originally the D.560 was fitted with gull-shaped wings, but these were replaced by a normal braced monoplane wing soon after the machine had been built.



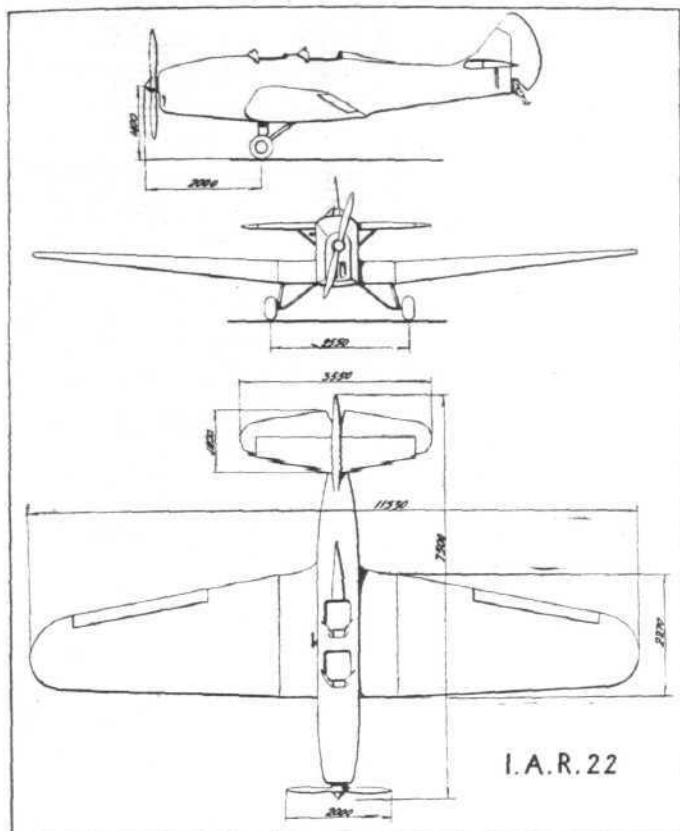
A Rumanian Trainer: The I.A.R.22

CONSTRUCTED by the Societate Anonima Industria Aeronautica Romana, of Brasov, Rumania, the I.A.R.22 is a new type of school machine which has given very satisfactory results in tests before the Acceptance Commission of the Rumanian Air Ministry. For normal flying training work the machine is fitted with a D.H. "Gipsy Major" engine of 130 h.p., but the fuselage and wing cellule have been made strong enough for almost any engine up to 300 h.p. to be fitted, which makes the



The I.A.R.22 Trainer.

DEWOITINE D.500				
Length	25 ft. 4 in. (7.74 m)			
Span	39 ft. 8 in. (12.1 m)			
Height	8 ft. 2 in. (2.7 m)			
Wing area	177.5 sq. ft. (16.5 m ²)			
Weight empty	2,785 lb. (1,266 kg)			
Weight loaded	3,752 lb. (1,705.5 kg)			
Speed at ground level	m.p.h.	km/h		
" " 3,280 ft. (1,000 m)	197.5	(318)		
" " 6,562 ft. (2,000 m)	204.1	(328.5)		
" " 13,120 ft. (4,000 m)	210.3	(338.5)		
" " 16,404 ft. (5,000 m)	224.6	(361.5)		
" " 19,680 ft. (6,000 m)	230.5	(371)		
" " 26,240 ft. (8,000 m)	226.3	(364.5)		
" " 32,808 ft. (10,000 m)	210.8	(339.5)		
Climb to 3,280 ft. (1,000 m)		min. sec.		
" " 6,560 ft. (2,000 m)		1 18		
" " 13,120 ft. (4,000 m)		2 48		
" " 16,404 ft. (5,000 m)		5 11		
" " 19,680 ft. (6,000 m)		6 38		
" " 26,240 ft. (8,000 m)		8 19		
" " 32,808 ft. (10,000 m)		13 26		
" " 34,120 ft. (10,400 m)		25 05		
" "		30 31		
Range	559.2 miles (900 km)			
Theoretical ceiling	35,433 ft. (10,800 m)			
Take-off run	476 ft. (145 m)			
Landing run	607 ft. (185 m)			



machine suitable for instructional work with guns, camera and wireless.

The aircraft is a low-wing cantilever monoplane of wooden construction, the wing having two spruce box spars and webs of Okume plywood. Plywood covering is used over all the wing except the trailing edge, which is covered with fabric.

The fuselage is constructed as a Warren truss, the members being assembled by duralumin gussets. Plywood covering is used for covering the forward portion of the fuselage, and fabric for the remainder. Ball bearings are

I.A.R. 22		
Engine	D.H. "Gipsy Major" 130 h.p.	
Wing span	37.8 ft. (11.53 m)	
Length	24.67 ft. (7.52 m)	
Total weight	1,940 lb. (880 kg)	
Wing loading	8.6 lb./sq. ft. (42.3 kg/m ²)	
Power loading	14.96 lb./h.p. (6.77 kg/h.p.)	
Maximum speed	119.92 m.p.h. (193 km/hr.)	
Minimum speed	45.8 m.p.h. (73.7 km/hr.)	
Time to 3,280 ft. (1 000 m)	5 min. 7 sec.	
" " 6,560 ft. (2 000 m)	11 min. 6 sec.	
" " 9,840 ft. (3 000 m)	19 min. 56 sec.	
Service ceiling	17,060 ft. (5 200 m)	
Theoretical ceiling	19,685 ft. (6 000 m)	

employed for all controls, and all the movable surfaces are balanced. The engine mounting is of welded steel tubes, and the petrol tank, which is of the "droppable" variety, is of riveted duralumin.

"Airwheels," Palmer differentially-operated brakes and I.A.R. shock absorbers are used for the undercarriage.

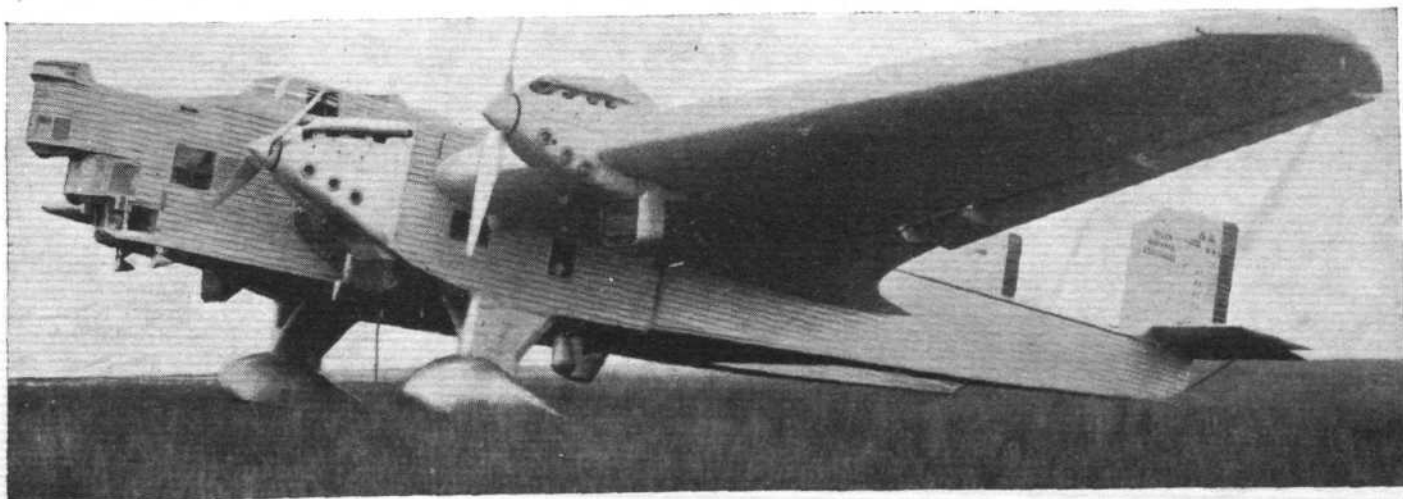
A French Tourer: The Potez 58

OVER 400 Potez machines of the types 36 and 43 are in service in various parts of the world. Taking the design of these machines as a guide and incorporating the experience obtained during their service, the Potez Co. has



produced a new aircraft with the type number 58. The machine has a cabin for three passengers with the pilot's seat in front and two seats side by side behind. Like the earlier types the machine is a high-wing strut-braced monoplane using a wing of conventional wooden two-spar design, fabric covered. Fixed slots are fitted, and the wings are easily folded. Plywood covering is used for the wooden fuselage. The engine fitted is a Potez type 6B six-cylinder radial developing 120 h.p. at 2,100 r.p.m. and 140 h.p. at 2,300 r.p.m. The weight is 258 lb. Welded steel tubes are used for the engine mounting and a Townsend ring is fitted as standard. With complete equipment, which includes parachutes, instruments, etc., the price of the machine is about 90,000 fcs. (£1,070) from which may be deducted, in the case of French buyers, the State premium of 35,000 fcs. (£416).

POTEZ 58		
Span	32 ft. 6 in. (11.3 m)	
Width folded	13 ft. 1 in. (4 m)	
Length	24 ft. 5 in. (7.45 m)	
Height	7 ft. 9 in. (2.36 m)	
Wing area	204 sq. ft. (19 m ²)	
Weight empty	1,120 lb. (509 kg)	
Disposable load	860 lb. (391 kg)	
Total weight	1,980 lb. (900 kg)	
Wing loading	9.71 lb./sq. ft. (47.4 kg/m ²)	
Power loading	16.5 lb./h.p. (7.5 kg/h.p.)	
Top speed	118.1 m.p.h. (190 km/hr.)	
Cruising speed	99.5 m.p.h. (160 km/hr.)	
Landing speed	34.2 m.p.h. (55 km/hr.)	
Ceiling	18,020 ft. (5 500 m)	
Take-off run	328 ft. (100 m)	
Landing run	197 ft. (60 m)	
Range	466 miles (750 km)	
Fuel consumption	6.17 gall./hr. (28 litres/hr.)	



WHERE IS THE MOAT? Here we see the latest development of the type A.B.21 bomber manufactured by the Société Aérienne Bordelaise. The machine, which has a span of over 120 ft., is fitted with four Lorraine "Petrel" engines.

Airisms from the Four Winds.

K.L.M. entry for England - Australia race

We understand that the K.L.M. company has entered two aircraft for the MacRobertson England-Australia race. It seems probable that one of these machines will be the F.XXXVI, which is now under construction. This machine will be a high-wing cantilever monoplane of typical Fokker construction fitted with four Wright "Cyclone" engines of 650 h.p. each, enclosed in N.A.C.A. cowlings. The estimated maximum speed is 168 m.p.h. and the cruising speed 142 m.p.h. When fitted for passenger carrying, the range at cruising speed should be about 870 miles. The other type to be entered is not known, but we would recall that besides the F.XXII which, like the F.XXXVI is nearing completion, K.L.M. have at their disposal the F.XX, which, in its latest form, is said to have a top speed of over 200 m.p.h. and a cruising speed of 171 m.p.h. This machine is at present in service on the Amsterdam-Berlin route. Surely there are few pilots more fitted to fly the machines than those who have flown so consistently well on the Amsterdam-Batavia route.

An Australian machine also?

On March 10 the London *Evening Standard* published a Reuter report to the effect that an all-Australian twin-engined two-seater monoplane is being built in Sydney for the forthcoming England-Australia race. The pilot, it is stated, will be Mr. D. Saville.

The U.S. air mail crashes

PRESIDENT ROOSEVELT has had to bow to the storm which has arisen over the numerous accidents which have overtaken Army pilots who have been detailed off to fly the air mails while the dispute over air mail contracts is being settled. Some ten pilots have lost their lives, some actually on the mail routes and others while in training for the work, or on their way to take up the duties. On March 11 Maj.-Gen. Foulois, Chief of the Army Air Corps, ordered the suspension for a few days of all Army air mail flying pending the drafting of modified air mail schedules.

Novel authorship

A VENTURE which should prove of great interest to all those concerned was planned to start on Wednesday, March 14, this being the flight of Messrs. F. E. Clifford and T. N. Stack in a "Leopard Moth" ("Gipsy Major") down the west coast of Africa. Their route lies through Marseilles and Alicante, and eventually to Lagos and Accra. Mr. Clifford, who is a well-known racing motorist and who has already accomplished a solo flight to the Cape, will on this occasion record the progress of his excursion with Capt. Stack by using a Dictaphone to write a book recording the impressions of the two pilots during their journey. The Dictaphone Co., Ltd., Rich & Cowan, Ltd., publishers, and Mr. C. A. G. Martin, managing director of Rowley Advertising Limited, are understood to be behind the venture, which is expected to cover a period of about a month.



A METAL-CLAD AIRSHIP: A drawing of an all-metal airship which, provided the necessary funds are made available, will be constructed for the U.S. Federal Government. It will be 550 ft. long, 119 ft. diameter, and will carry a crew of 30, with 20-30 passengers and mail up to 12,000 lb. The airship is to be used on a service between Washington, Puerto Rico and Brazil, and thence to Cape Town.

For stratospheric research

A FUND, to be named after Fedossenko, Vasenko and Usiskin, the Soviet airmen who perished in the wreck of the stratostat *Osoaviakhim* is to be inaugurated under the auspices of *Osoaviakhim* (Society for Air and Chemical Defence). The proceeds of this fund, which is to be supported by voluntary contributions, will be devoted to financing further exploration of the stratosphere. The Rubber Research Institute, which is attached to the Rubber Industry of the U.S.S.R., is ready to build the new stratostat *Osoaviakhim II*. A group of engineers at the Institute have worked out a new design for the balloon, which will be considerably lighter than the *U.S.S.R.*, which made a successful ascent into the stratosphere last September. The fabric will be capable of resisting temperatures as low as minus 70 deg. C. According to one report, it is claimed that the balloon will be capable of reaching a height of 24 miles. No crew will be carried, but all the apparatus will function automatically. Photographs will be taken from various heights of the earth's surface, and instruments will transmit the impulses of cosmic rays by wireless.

British antarctic expedition

UNDER the leadership of Mr. J. R. Rymill, a member of the Watkins Arctic Air Route Expedition, a British Antarctic Expedition has been organised and will leave England in September next for Graham Land. The coast-



IMITATION THE SINCEREST FORM OF FLATTERY: This machine, known as the "Chidorigo," was constructed by the Tokio Gas & Electric Industry Co., and is remarkably like a D.H. "Fox Moth"—although the company is in no way associated with the de Havilland Co. It is fitted with a 7-cyl. 150 h.p. Gasden "Zimpu" (which, again, closely resembles the Armstrong-Siddeley "Mongoose"). It is being used by the Japan Aerial Transport Co. for taxi and joy-riding purposes. A brief specification of this machine is as follows:—Span, 9 ft. 2 in.; wing area, 236.7 sq. ft.; weight empty, 1,212.75 lb.; laden weight, 2,116.8 lb.; speed range, 46-122 m.p.h.; range, 404 miles.

line between Luitpold Land and Charcot Land will be explored, and the expedition will carry an aeroplane which will be used for reconnoitring for a lane through the pack ice, and for other reconnaissance work.

Fast flights on a "Gull"

ONE of the Percival "Gulls" (Napier "Javelin" engine) gave a demonstration of its high cruising speed recently. On March 7 Mr. Lacayo flew from Gravesend aerodrome to the Kastrup aerodrome, Copenhagen, Denmark, in a flying time of 4 hours 40 minutes. After leaving Gravesend Mr. Lacayo circled Lympne in the usual way to be reported, and after circling Calais he set off along the coast to Amsterdam, where a landing was made. The next landing was at Travemünde for fuel. This was a little out of the direct route from Hamburg, but Mr. Lacayo met foul weather in the neighbourhood of Oldenburg, and decided to call at Travemünde before setting out across the Baltic to Denmark.

On Friday, March 9, the return flight was made in exactly 5 hours. The "Gull" belongs to Baron von Schinkel, of the Royal Swedish Air Force, who was flying it to Cannes, and decided that it would not take him long to call in England and drop Mr. Lacayo.

Air mail boxes in Cape Town

SEVERAL blue air mail pillar boxes are being erected in Cape Town. The first of these has been placed outside the General Post Office, and others will be located at advantageous points in the near future.

Autogiro deck landing trials

MR. DE LA CIERVA, who at present is touring Spain with the latest type of C.30 direct-control "Autogiro," recently landed on the deck of the Spanish ship *Dedalo* off Valencia. The machine made a perfect landing with plenty of space to spare, and took off again with equal ease. Mr. de la Cierva, who is giving lectures and demonstrations in all the places he visits, is being fêted everywhere.

Latest bomber for Japanese army

THE Japanese Army Air Force has recently given orders for large numbers of Kawasaki "93" two-seater high-performance day bombers for re-equipment purposes. The maximum speed reported is 167.7 m.p.h. (270 km/hr) and the engine is a Kawasaki B.M.W. 600 h.p.

"Cyclones," not "Hornets"

IN our issue of January 18, 1934, in referring to the splendid flight of six Consolidated flying boats of the U.S. Navy from San Francisco to Honolulu, we stated that these

machines were fitted with Pratt & Whitney "Hornet" engines. Mr. H. Caldwell, of the Curtiss-Wright Export Corporation, informs us that this was incorrect, and that each of the six flying boats was powered by two Wright "Cyclones," which functioned perfectly throughout the 24-25 hours which it took the machines to cover the distance of 2,408 miles non-stop.

A. V. Roe to build autogiros

WE are informed that Messrs. A. V. Roe & Co., Ltd., of Newton Heath, Manchester, have acquired a licence for the manufacture, use and sale of the Autogiro. They are taking immediate steps to put the latest type of machine, the "Direct Control" C.30.P, into production. The Air Ministry has placed an order with Messrs. A. V. Roe & Co., Ltd., for ten of these machines, and a number of orders have already been taken from other quarters in England and abroad. The price of the C.30.P is £1,250 ex-works, and delivery can be effected towards the end of June.

The Nieuport "Tailless"

THE Nieuport tailless machine exhibited at the last Paris Aero Show is now being developed, and the flying tests are being made under the supervision of the famous Sadi Lecoq, Nieuport's chief test pilot. The machine, it may be recollected, is a pusher, and the engine is a 120-h.p. 5-cyl. radial air-cooled Lorraine. A wheel under the nose minimises the risk of turning over on the ground.

Telling Europe about Mt. Everest

COL. ETHERTON left recently on a lecturing tour to Prague, Vienna, Budapest and Rome, where he will lecture on the Houston-Everest Flight Expedition. Col. Blacker is also lecturing on the flight, his audiences being at Amsterdam and The Hague.

Our modern deserts

AN amusing story comes from Cairo. On a recent westbound flight of one of Imperial Airways machines, the pilot Capt. Spafford landed *Hannibal* in the desert about 80 miles west of Rutbah to make some minor adjustments. As soon as the machine came to a standstill the pilot assured his passengers that there was nothing serious the matter, and many of them de-aeroplaned to have a glance at the boundless waste of "the real desert." Within a very short time, however, there arrived five R.A.F. machines, who gave an impromptu display of flying, an Avro "X" piloted by Capt. Wheeler, engaged in work for Iraq Petroleum Co., and two cars, driven by natives who did not even deign to stop.



FAIREYS AT THE BOTTOM OF THE GARDEN: This photograph, taken on board the aircraft carrier *Courageous* during the Spring Cruise in the Mediterranean, is of interest not only on account of the large number of Fairey machines ranged on the flying deck, but also because at the back, over the extreme stern, may be seen the Supermarine "Seagull Mark V" with Bristol "Pegasus" engine. The presence of the latest type of amphibian flying boat on board the carrier may be significant.

Airport News.

CROYDON

A PARTY of ten delighted people landed at Croydon recently after a 6½-hour flight from Marseilles by Air-France. They were English folk eager to get to their homes as quickly as possible after a long spell in India. They landed at Croydon one hour before the time of departure of the train from Marseilles which they would normally have caught.

Provincial Airways, Ltd., are starting services on the London-Plymouth route on Monday, March 19. For the first few days, I am informed, machines will leave Croydon at 10 a.m. and 3 p.m. and Plymouth at 9 a.m. and 2 p.m. An express non-stop service will be run towards the middle of the first week, leaving Plymouth 9 a.m. arriving Croydon 10.30 a.m., and returning at 12 noon, arriving Plymouth 1.30 p.m. A machine will also be ready to bring passengers from liners at Plymouth to Croydon in 1½ hours. A novel arrangement in this country also will be the Air-travel week-end. Inclusive tickets are to be obtainable to cover door to door car transport, flying and hotel accommodation. It will be possible to spend the week-end—Friday afternoon to Sunday evening, or Saturday morning to Monday morning—at Bournemouth, Weymouth, Teignmouth, Dawlish, Torquay and several other places for 7 guineas inclusive. West Country people can spend week-ends in London on similar terms with choice of nine London hotels. The idea is an admirable one and should attract passengers. I wish the company every success in their new venture.

A passenger of distinguished ancestry weighing 12 stone went aboard the Air-France machine for Geneva the other morning amidst the clicking of Press cameras—a large white pedigree pig from a famous pig-breeding establishment. K.L.M. has tropical fish amongst the livestock carried fairly often. These valuable creatures have to travel in tepid water, and great care is taken by the company to see that the water never grows cold. A letter of instruction from a consignor in the matter of a consignment of fish which had to travel by rail after the air journey, requested the air company to see that the guard of the train kept the fish warm. There was one historic occasion years ago when some of these fish landed at Lympe or Penshurst, travelled to Croydon on top of a passenger car on a freezing winter's night and arrived in what Sam Weller would have called "a mask of hicc."

Sir Cecil Clementi, Lady Clementi and their two daughters landed at Croydon on March 9 from Cairo by K.L.M., thus saving a considerable number of travel days. Sir Cecil is Governor of the Straits Settlements. A recent outward passenger of the same company from Croydon to Baghdad was the son of the British Ambassador there.

One of the air traffic companies at Croydon received a



A new Dutch airport

EINDHOVEN, in the Province of Brabant, famous as the site of the Philips works, is being provided with an aerodrome. K.L.M. will operate a regular service to Eindhoven which will be incorporated in the system of Dutch internal air lines. A wireless station is included in the project. The new aerodrome will be under the direction of Mr. R. Castendyke, who has been appointed by K.L.M. and the Town Council of Eindhoven. From May 1 it is intended to operate the following services:—Amsterdam-Rotterdam-Eindhoven-Cologne and Groningen-Twenty-Eindhoven-Brussels.

Night flying without navigation lights

ROYAL AIR FORCE aircraft may be flying by night within a radius of ten miles of Gosport each Monday and Thursday until June 28 next, between 8.0 p.m. and 10.30 p.m. Above an altitude of 5,000 ft. the aircraft will not exhibit navigation lights unless other aircraft are observed in their vicinity.

Lloyd's register

SPEAKING at the fortieth annual dinner of Lloyd's Register Cricket Club, the chairman, Mr. Andrew Scott, said that Lloyd's Register and the British Corporation

letter from a youth seeking employment in which he ended up with the remark "I have worked in the engine shops of Messrs. ——— for six months. Hoping this will not inconvenience you."

Officials of Imperial Airways, Ltd., have obtained interesting average weights of passengers on some sections of the Empire routes. British and American men average 12 stone, British and American women, 10 stone. Other nationalities average 12 stone 2 lb. for men and 9 stone 6 lb. for women. British and American women therefore average 8 lb. more than foreign women, but Anglo-Saxon males give away 2 lb. to the foreigners. I think, however, that officials of the Scandinavian Air Express would say that Scandinavian ladies weigh heavier than their British sisters. Statistics of air line pilots would surely show German and Dutch heavier than British and Belgian, but French pilots much lighter than all of them.

The kiosk in the Airport Main Hall is so nearly ready that an inquisitive gentleman trying out the pull-down shutters with which it is fitted, nearly decapitated himself.

A wise private owner, M. D'Okhuysen, trainer of the famous French horse Trocadero, lays up his "Puss Moth" in winter and travels by Air-France. He passed through the airport on Saturday last.

A. VIATOR.

HESTON

ON March 8, the first of two Spartan "Cruisers" ordered through Henlys, of Heston, left the airport on its delivery flight to the firm of Bata at Zlin, Czechoslovakia. The pilot was Mr. Lynch Blossie, and he was accompanied by Mr. Selucky, one of Bata's staff pilots.

On Sunday, March 4, Princess Beatrice paid the airport an unexpected visit. The Princess had tea in the restaurant and watched the flying with great interest.

Birkett Air Service, Ltd., who specialise in private charters for the Press, have recently purchased two more "Puss Moths" to cope with the increased demand from this and other quarters.

Capt. G. W. Ferguson, of Airwork, who has done much taxi work for Gaumont-British Distributors, Ltd., recently made a flight to the Cheltenham races for this company.

He is taking their camera men to the Lincoln on March 21, and to the Grand National.

During the past week, five aeroplanes came into the Heston workshops for renewal of their Certificates of Airworthiness. Seventy C. of A. overhauls were carried out in 1933 by the Airwork Service Department.

On Wednesday, March 7, the Jersey Airways "Dragon" landed at 4 p.m. trailing clouds of glory and white ribbon, for Mr. and Mrs. Stevens travelled in it to London after their marriage in Jersey.



were, through their Joint Committee, continuing to work in close harmony for the inspection of aircraft. They were also awaiting the findings of the Gorrell Committee and felt sure that they could rely upon their friends Mr. Handley Page and Capt. Lamplugh to see that justice was done to the Joint Committee.

Sir George Higgins, in reply to the toast of "Our Club and Patrons," said that they could not, as yet, refer to the work of the Gorrell Committee, as this was *sub judice*. He hoped that, as a result of the findings of the committee, the scope of the Joint Committee of Lloyd's Register and British Corporation would be enlarged to the advantage of the aviation industry which, though still in its infancy, had a great future.

Mr. A. L. Sturge proposed the toast of "Our Out-port Members and Guests," and in doing so mentioned among those present connected with aviation, the names of Lt. Col. F. C. Sheldermine, Director of Civil Aviation; Lt. Col. H. W. Outram, Director of Aeronautical Inspection; and Mr. C. J. Galpin, Private Secretary to the Secretary of State for Air.

The speeches following the dinner were, as usual, interspersed with songs by such old favourites as Messrs. Soar and Kinniburgh, as well as the laughable efforts of several well-known entertainers.

THE AIR ESTIMATES

THE debate on the Air Estimates began in the House of Commons on Thursday, March 8. In accordance with custom, the debate was preceded by an introductory speech by the Under-Secretary for State for Air, the Rt. Hon. Sir Philip Sassoon, M.P. Sir Philip's speech is given almost in full below.

I have before me this afternoon a far from easy task. For there are in this House, as I well know, two diametrically opposed schools of thought who differ with earnestness and vigour on the subject of the fighting Services in general and the Royal Air Force in particular. Perhaps the divergence between these two schools is more acute than ever at the present time. On the one hand, there are those who regard the air arm as a direct and imminent threat to the survival of our present-day civilisation, and would like to see all military aircraft swept out of existence. On the other, there are those who consider that the provision which His Majesty's Government has made hitherto for the air defence of these islands is utterly inadequate, and would like to see a large and immediate increase in the number of our Service machines.

The House will have observed that the Estimates which I present to-day disclose, for the first time after the sacrifices of recent years, a modest upward trend. The net figure of £17,561,000 shows an increase of £135,000 only. A truer picture is provided this year by a comparison of the gross Estimates. These at £20,165,000 show an increase of £527,000. The explanation is twofold. As a result of the deliberations of the recently appointed Tribunal on Indian Defence Expenditure, we are getting an extra £100,000 from India in respect of the initial training, etc., in this country of Royal Air Force personnel serving on the Indian establishment. Secondly, the bulk of expenditure on the Fleet Air Arm is borne under the current arrangements by Navy Votes and does not appear in our net total, but only in the gross figures as a grant in aid.

The Increase

For this moderate increase in expenditure, the country is going to get—as explained in my noble friend's memorandum—four new squadrons; two for home defence, one flying boat squadron, and the equivalent of one squadron for the Fleet Air Arm. In addition, two Home Defence Squadrons, now forming part of one of our experimental establishments, will be reconstituted and given separate entity. Thus, though the nominal increase in our first-line strength will be four squadrons, we shall in fact be getting an effective increase of six squadrons. Before turning to the details of the Estimates, I should like, therefore, to review briefly the circumstances and considerations which have led His Majesty's Government to adopt this particular course.

In the first place, as I scarcely need to remind the House, the pressing need for economy, which has stamped its mark upon all the Estimates of recent years, still persists. It is obviously undesirable that the tide of returning prosperity should be checked or thrown back by too early or too lavish an increase in the scale of national expenditure.

Secondly, and no less obviously, the world has reached a critical point of extreme delicacy in the matter of disarmament. Last year I expressed the hope that the Disarmament Conference would come to a satisfactory agreement for the limitation and reduction of air armaments. That has not yet been done.

We have followed a policy of studious moderation in the matter of air armaments for over 15 years. That period is substantially longer than Jacob served for Rachel, and we have not even had the doubtful consolation of acquiring a Leah by the way. Far from accepting our proposals, farther yet from following our example, other nations have steadily increased the strength of their respective air arms until they far outnumber our own.

That is not the whole story; the latest developments are still more striking. The President of the United States has recently sanctioned an additional expenditure of some £3,000,000 on new aircraft for the American naval and military air services. Russia and Japan are also largely expanding their air forces.

The intentions of Russia are indicated by a Red Army Order of August 18, 1933, signed by the War Minister Voroshilov. It is as follows:—"Technically equipped,

confident of its force, stands the Red Air Fleet at the gates of its future, intently and energetically working on the completion of its historical task—to overtake and surpass the capitalist countries most advanced in aviation."

Increased funds for air armament have been provided by a long list of other countries, including Italy, Belgium, Switzerland, and Czechoslovakia; while of our own Dominions, Australia, South Africa, and New Zealand have authorised a considerable increase in their air expenditure for the coming year.

In these circumstances, His Majesty's Government feel that it is impossible for this country to continue to hold in abeyance the ten-year-old programme of 1923, now so long overdue for completion. We cannot afford to accept a position of continuing inferiority. We have made it plain that this country must, so long as air forces exist, have parity in the air, however that parity be attained.

But the time has come when we can no longer afford to ignore the fact that, while all nations talk of disarmament, almost all nations but ourselves are increasing their air armaments extensively. If other nations will not come down to our level, then, inevitably, our national and imperial security demands that we must begin to build up towards theirs.

These Estimates, therefore, in broad outline, are the outcome of our desire to pursue disarmament and study economy on the one hand, and, on the other, of our reluctant conviction that the policy of postponement cannot be continued. Resumption of the scheme of 1923 has become inevitable; but we do not want at this stage to put forward a programme of construction which might prove to be the starting gun for a race in air armaments. In the interests of world peace, the initial measure of advance for which these Estimates make provision is being designedly kept within the most modest bounds.

Now let me say a few words on the details of the Estimates themselves.

Vote 3 comprises over 40 per cent. of total air expenditure, and is the dominant Vote of the Estimates. It provides for that technical equipment which is vital to the service. This year there is a gross increase of £300,000 in the Vote, which I feel sure many hon. members will welcome, since some £250,000 of it means that we are ordering a larger number of new machines and engines than last year. It will, I hope, not be entirely unwelcome to the remainder of the House, since it means also that we shall be giving increased employment.

The Dhibban Base

Vote 4, for works, buildings and lands shows a net addition of £65,000, but is still more than £100,000 lower than in 1931. The increase is primarily due to provision for the further development of the new air base at Dhibban in Iraq, with regard to which it may well be that hon. members would like some short explanation.

First of all, I should explain that Article 5 of the Treaty of Alliance between the United Kingdom and Iraq, of June 30, 1930, specifically provides for the construction of "an air base to be selected by His Britannic Majesty to the West of the Euphrates." We are bound by that provision; but I may say at once that there are considerable advantages, from the point of view of the Royal Air Force, in the transfer from the present air base at Hinaidi.

The site at Dhibban, too isolated according to some, is, after all, only 50 miles from Baghdad, half an hour, that is, by air and 2 hours by road. It is a good deal nearer, for instance, than my own constituency of Hythe is to Westminster. It was selected after the most exhaustive consideration of all possible alternatives. Strategically, it is definitely preferable to Hinaidi. It has an easy line of communication running westwards to Transjordan and Palestine through desert country readily negotiated by modern motor transport and inhabited but sparsely by friendly tribes. This line of communication is considered to be materially safer than the corresponding line between Baghdad and Basra, which passes through areas closely inhabited by powerful tribes who have been active insurgents in past disturbances in Iraq. Moreover, Dhibban lies west of the rivers which would have to be crossed by hostile tribesmen coming from most quarters of Iraq, and the bridgeheads of which we could control—not, of course, that there is any reason to anticipate trouble under existing conditions.

Another most important consideration is that Dhibban is a much healthier site than Hinaidi. It is free from the dangerous disease-bearing mosquitos, and at Dhibban our personnel should escape some other minor ailments from which they have suffered at Hinaidi. It affords ample space for the provision of recreational facilities, including bathing in Lake Habbaniyah.

I am happy to add that the cost of the change over is in reality much less formidable than the figure of £1,450,000 at which it appears in these Estimates. The net capital cost should not in fact exceed £350,000. Had we remained at Hinaidi and Mosul, it would have been necessary to have spent at least £750,000 at an early date on reconstruction. This does not mean, of course, that when these stations are transferred to the Iraq Government they will be faced with a similar expenditure. Their requirements are altogether different from our own, both in kind and in quantity. Moreover, under the arrangements agreed, the Iraq Government will in due course pay us some £350,000 for the stations and buildings transferred to them. In addition, there will, with the Royal Air Force concentrated in future at two stations only, be a substantial reduction in maintenance and administrative costs.

I think that the only other Vote on which I need comment at this stage is Vote 8, for civil aviation, which stands at £513,000, representing the highest level for the past ten years. I hope to satisfy the House in due course that we are going to get good value for the increase in this Vote.

Work of the R.A.F.

There have again been a number of long-distance flights by overseas units, in particular between Singapore and the North-West Frontier of India in both directions and across Africa. A total of over 200,000 aircraft miles was covered in these flights during 1933. As explained on previous occasions, these long-distance flights help in no small degree to maintain the efficiency of the Service, and supply, without additional expense, valuable information for the subsequent establishment of civil air lines. It is intended to continue and to increase the number of these long-distance flights during the present year, and to arrange for them to be accompanied, so far as possible, by air-borne equipment and supplies. As illustrating the growing range of operations, I may mention that a series of non-stop flights has been carried out with complete success in Iraq by formations of standard land aircraft, with ordinary service long-range tanks. Some of these non-stop flights have covered distances well over 1,000 miles.

In addition to these more formally organised cruises, machines based on such centres as Basra and Aden are constantly at work within their own normal radius of action, maintaining and developing communications, and increasing the areas within which the Pax Britannica brings order and security to replace rapine and oppression.

Last year I sought to emphasise the remarkable advantage offered by air power as an instrument of peace. My reward was that of many who seek to advocate, at a season when it still wears the appearance of a paradox, something which in a few years' time is destined to become a truism. Those who disagree with me tried to "blanket" my argument with ridicule. Yet each year furnishes new instances of the truth of what I said. It is not, indeed, by fighting locusts or dropping blankets, or even evacuating threatened civilians or carrying medical assistance to the sick and injured, that the Royal Air Force does its only work for peace, though the list of these humane activities is a long one. In the establishment of the rule of law and the preservation of the life, liberty and goods of the subject, on the frontiers of our Empire, the policeman and the philanthropist go hand in hand.

The House will perhaps bear with me once more, if I illustrate my argument with one or two recent and typical incidents. Only a few weeks ago the territory of a tribe nominally under our protection in the remote hinterland of Aden was overrun by hostile tribesmen from across the frontier. Hostages and loot were taken, and there was a danger of the commencement of a régime of oppression from without, such as prevailed over a large part of the Protectorate before the advent of air control. A stern warning was issued that, unless the hostages and loot were returned and all molestation brought to an immediate end, punitive air action would be taken against the frontier forts of the offenders. The warning produced a wholly satisfactory result in the shortest possible time. The loot and hostages were restored and all aggression ceased—and

this without the firing of a shot, the dropping of a bomb or the infliction of a single casualty.

A second incident is reminiscent of that immortal combat which is chronicled in "Alice Through the Looking Glass." Some of our aircraft were returning from an ordinary routine flight, when they saw beneath them a tribal affray in full swing. A strong tribe from across the frontier had just begun a fierce attack on a tribe under our protection, when our aircraft fortuitously arrived upon the scene. At the mere sight of the policeman, miraculously summoned, as they thought, at even shorter notice than usual, the raiders broke off the battle and dispersed with great rapidity. Readers of Lewis Carroll will remember how Tweedledum and Tweedledee agreed to have a battle, when the sudden appearance of a monstrous bird so frightened both the heroes that they quite forgot their quarrel. In the present case fact improved upon fiction, in that it was only the villains of the piece who were frightened into good behaviour.

It is instances like these, multiplied on all our frontiers, which have led His Majesty's Government to insist that police bombing in outlying districts shall be excepted from any general prohibition of bombing from the air. But the dropping of bombs is only the final stage of police action, and in most cases peace is restored without resort to force at all. The policeman's truncheon is only brought into action infrequently, and generally a mere "Move along, there!" suffices.

Thus, in one instance we have found an address from the air by loud speakers, perhaps I should say very loud speakers, singularly effective. If this fails, the offenders are given another chance and their notice is specifically drawn to the truncheon before it is actually brought into play. In other words, we first drop *dummy* bombs as a warning. It is only after all these preliminary stages have failed to produce the desired result—which is seldom—that recourse is had to actual bombing.

In the course of the past year I had occasion to collect together certain statistics, illustrative of the striking manner in which the use of air power has reduced and almost abolished the "blood bill" which before the advent of the air arm we paid as the price of an uncertain peace on the frontiers of our Empire. I will not weary the House with figures which are accessible to all.

In the light of them, it is, to my mind, unthinkable that we should deliberately and of choice go back to the old methods, after our experience of the new.

Petrol from Coal

Before turning to the subject of civil aviation, there are one or two developments in connection with the work of the Royal Air Force at home to which I should like briefly to direct the attention of the House. In the first place, there has been going on during the past year experiment of much general interest at the present time. Since February, 1933, one of our squadrons has been operating upon petrol produced from British coal by the low-temperature carbonisation process. The results have been so satisfactory that it has been decided to accept coal-petrol as a normal supply. It is expected that sufficient British produced fuel will be available in the coming year for the use of seven squadrons. Hon. members will rejoice, I feel sure, to know of this new outlet for British coal which, small as it is as yet, has definite possibilities of growth.

As regards petrol engines, one of the more interesting developments of the year is an air-cooled engine which operates with sleeve valves, instead of poppet valves. Constant experiments, in which our new and reconstructed wind tunnels are proving of the greatest service, have been conducted also in machine design with a view to increasing performance and the safety factor.

It is impossible in the time at my disposal to do full justice to the subject of Research and Technical Development, interesting as it is, and absolutely vital to the progress of both civil and military flying. I should like, however, to acknowledge publicly the great assistance we have received from outside scientists, and the readiness with which so many distinguished men have placed their services at the disposal of the Air Ministry; whether through the medium of the Aeronautical Research Committee, or by independent work at Oxford, Cambridge and other Universities. I must give a word of praise, also, to the two pilots who are carrying on the work of the meteorological flight at Duxford. In all weathers all through the year they fly daily to great heights and acquire

knowledge of conditions in the upper atmosphere which are of the greatest value in the preparation of weather forecasts.

Civil Aviation

I will now attempt to outline briefly the principal new developments in civil aviation for which provision is made in 1934, and to give some account of the encouraging progress made in the past twelve months.

His Majesty's Government, in conjunction with the Government of India and through the agency of Imperial Airways, have organised our part of the route to Australia, and a regular weekly service is now working as far as Singapore. The Australian Government have got before them tenders for the final Singapore-Australian section, and I have every hope that by the autumn the whole route will be in operation.

Trans-Atlantic Prospects

Turning from East to West, an entirely new project for which a provision of £10,000 is made in these Estimates is a weekly service between New York and Bermuda, in which Imperial Airways and American interests will co-operate. Apart from its local importance, this new route is of special interest in that it may prove to be a first link in a transatlantic service, though we are also making a close study, in conjunction with the Canadian and Newfoundland Governments, of the alternative direct route via Newfoundland.

Civil Flying at Home

Coming home, it was the fashion at one time to say that there was little scope in these islands for what I may term domestic flying. Latterly, however, it has become clear that that opinion will have to be modified. Last year there was an encouraging growth of internal air services and some 12 companies were in operation.

I will say nothing at this stage of the debate, on the very important question of the future development of aerodromes in this country. I shall have an opportunity of dealing with this subject when replying to the resolution, which, I understand, the Hon. Member for Thirsk and Melton intends to move later this evening.

Generally, 1933 may be regarded as a year of distinct progress by British civil aviation. There has, for example, been an encouraging increase in both the passenger and mail traffic dealt with by Imperial Airways. Some 85 tons of mails were carried by the company in the year, as compared with 64 tons during 1932, representing an increase of approximately 33½ per cent.

Of the 87,000 passengers dealt with by all the continental services, Imperial Airways carried just under 50,000. The figures furnish gratifying testimony to the reputation for comfort and safety which Imperial Airways have established. Accidents there must unfortunately be from time to time in all forms of transport. But it is a striking tribute to Imperial Airways' record that Lloyds are now accepting the company's passengers at the same rate per day of air travel as that for land and sea travel. No other air transport organisation enjoys such favourable rates.

A noteworthy characteristic of the 1933 passenger figures is the increasing use made of the company's services by business men. Early in the year, to take a single example, a passenger alighted at Croydon who in 80 days had paid business calls on clients in Palestine, Egypt, Iraq, Uganda, Tanganyika, Rhodesia and South Africa. By surface transport the round trip would have taken him 180 days.

The evidence of gradual economic recovery which has begun to show itself during the past year in so many directions is to be found also in the case of civil aviation. There was a healthy increase in the number of pilots' licences issued and in the number of aircraft possessing certificates of airworthiness during the year. The Light Aeroplane Club movement, also, is on the whole making very satisfactory progress under the revised and improved conditions which I announced to the House last March.

Air Ministry Control

Before I leave the subject of civil aviation, it may be of interest to the House if I say a few words upon a matter which I know has occupied the minds of a good many members for some time past. My hon. and gallant friend the member for Wallasey made a speech not long ago in which he suggested that the question whether civil aviation should remain under the Air Ministry required investigation.

My hon. and gallant friend's speeches on air matters, as on other matters, are always stimulating and instructive. The Royal Aero Club has accorded him the proud distinction of having made the first aeroplane flight in this country and, since that day, he has never lost interest in, and is an acknowledged authority on, matters aeronautical.

I agree that *world* civil aviation has laboured under a handicap by reason of its associations with military aviation, but I do not agree that it would improve matters one whit in this country if the control of civil aviation were taken from the Air Ministry. It is abroad, and not in this country, that civil aviation has been made an adjunct of military power.

In some foreign countries the development of commercial aviation has been coloured by the desire to create a reserve of aircraft and personnel suitable for military use. But the striking fact is that this policy was adopted at a time when civil aviation in the countries concerned was not under a military department at all, but still under a civil department. The policy has played havoc with economic development abroad, but it is one which has never been followed in this country. The one goal which the Air Ministry has throughout set before Imperial Airways is that it would put its operations on a commercial basis and become self-supporting at the earliest possible moment.

With that goal in view, the design and number of the company's fleet has never been interfered with by the Air Ministry. Such matters have been left to the company and its expert advisers, and have been governed solely by considerations of strict business economy. The result has been that with a far smaller subsidy the company has now progressed towards an economic basis of operation far beyond all its Continental rivals.

It is, then, quite clear that British Air Transport has not been deflected from a genuine commercial basis of operation by the fact that the Air Ministry is charged with responsibility for it. On the other hand, there are overwhelming practical reasons for continuing that responsibility.

In the first place, there are, so far as I can see, only two other departments under which civil aviation could possibly be placed, namely, the Ministry of Transport and the Board of Trade. The Ministry of Transport is more than fully occupied by its road and rail problems and, moreover, its functions are at present confined to *internal* transport. The Board of Trade, if I may say so without disrespect, is already the "pooh-bah" of Government Departments. It is responsible for overseas trade, for industries and manufactures, for patents, for commercial relations, for the mercantile marine, for public companies, for bankruptcy, for mines, for petroleum and a whole host of subordinate activities. It is almost a miracle that it discharges its immensely wide and varied responsibilities so efficiently!

Further, any transfer would necessitate an extensive duplication of staff, a pullulation of technical bureaucrats which I hardly think would commend itself to this House. Such questions as angles of incidence, stagger, streamlining, spinning, buffeting and a host of other aerodynamical problems affect equally aircraft for commercial and for military uses. The same applies to the study of metal fatigue, alloys, corrosion, propeller design, wireless telegraphy and telephony, and meteorology. You simply cannot from these angles divorce commercial from military development, at a time when the whole technique is so fluid.

To sum up, I do not believe there is any theoretical case for the divorce of civil aviation from the Air Ministry. I am quite certain that such divorce is a practical impossibility and is likely to remain so for a long time to come.

The Gorell Committee

Here I may perhaps pause for a moment to pay a tribute to the work which an authoritative independent committee, under the chairmanship of Lord Gorell, is doing on certain civil aviation problems. The original terms of reference of the committee have been extended to cover various important issues on which the Air Council are desirous of having independent outside advice. Not only the Air Ministry, but this House and the country, owe a great debt to the members of this committee, including three members of this House, who are giving up so much of their time to these arduous and complex investigations.

My noble friend testified on his return from his recent tour to the splendid spirit which he found pervading the personnel of the R.A.F. at all the stations he visited. The same spirit exists equally at home. It would not have been altogether surprising if all the talk which has been taking place of recent years on the subject of the total abolition of air forces had resulted in a certain discouragement and apathy among those who have chosen the Royal Air Force as their career.

I would ask hon. members to bear this aspect of a difficult question constantly in mind; I am sure that the House as a whole realises that the Royal Air Force is now, alongside the Royal Navy, the first-line of defence of these islands and of the Empire. We must look to it that we do nothing to undermine the spirit and courage of that defence, so long as it remains necessary to our national security.

I believe that no harm has been done as yet, but that is due to the loyalty and devotion of all ranks of a Service which, as I am sure the House will agree, has fully proved its worthiness to take co-equal place with the two older Services in the trinity of Imperial defence.

THE DEBATE

MR. ATTLEE, for the Opposition, said that he was not qualified to discuss the technical details of the Estimates. He was struck by the amount spent on the younger Service compared with what was spent on the older Services. Defence expenditure was called our insurance. He asked, first, was that insurance effective, and, secondly, was the amount right in respect of the various risks which might come to this country. For air risks was paid one-fifth. All warfare was the propulsion of a projectile on to a target, and the defence of that target. The delivery of a bomb by aeroplane was in essence the same thing as David slinging a stone at Goliath. To-day the dominant projectile was the air weapon. He took it as an established fact that in any future war the decision would be reached in the air. There was no effective defence against air attack. To his mind the proposals put forward by this country to the Disarmament Conference had not got rid of competition in air armaments. He held that it was a mistake not to have urged the internationalising of civil flying. He urged hon. members to consider internationalising the air forces of the world as an international police force. It was not too late for the Government to say that our Air Force was a contribution to the force which should support the rule of law in the world.

CAPT. GUEST agreed with Mr. Attlee that the Estimates failed to indicate a policy. He averred that Germany had every intention of re-arming as quickly and as best she could, and that she intended to annex Austria. It was obvious that Italy would interfere, and it was hard to say what would be the result of that. It was another simple truth that if anything did happen in the next few years, Ireland would be delighted to side with any enemy of Great Britain. Serious members of the Belgian Cabinet were frightened at the danger from Germany. France, presumably, was our friend, but she was rocking with internal troubles. Considering what we did know about Germany, he complained that in our Estimates there was no provision for the future, for any development which we might afterwards be called upon to make. London was easy to find from the air, and there was no alternative capital. All our aircraft factories were within 15 miles of London. Turning to civil flying, he thought that the agreement made by Imperial Airways with the railways had been made behind the back of the Air Minister, and he asked the Under Secretary for a statement on that point.

MR. MANDER (Liberal) complained of a lack of policy in the Estimates. He said that under them we neither armed nor disarmed. The policy was a half-hearted one of doing neither one thing nor the other, which was absolutely futile and hopeless, and was leading straight to disaster. We should either have a whole-hearted disarmament policy and pursue it with all the vigour possible, or we should re-arm. The only policy which he believed could save us was to use our influence to attain immediately the abolition of air forces all over the world, coupled with the international control of civil flying.

MR. WINSTON CHURCHILL, in a very fine speech, said that it was certain that our attempts at persuading Europe to disarm had failed. In view of that we must take measures to put ourselves in a state of reasonable security. There were four lines which we could follow. First, we should continue to pursue a peaceful policy. We must continue to strive to preserve the peace and harmony of Europe. Secondly, we ought not to neglect any security which we can derive from international conventions. He did not agree with those who said that these international conventions were not worth the paper on which they were written. It might well be that vague, general, pious affirmations like the Kellogg Pact did not carry much practical conviction to people's minds. But when one came to more definite, limited, and precise arrangements, he believed that a greater measure of confidence could be reposed in them. At any rate, we should be very foolish to neglect them. We should strive to secure an international convention confining our air warfare to military and naval objectives and to the zones of field armies. He hoped the House would not be led by very easy arguments to suppose there was no validity or virtue in such arrangements. All the experience of the world showed that they had played their part even in the most hideous quarrels of nations, and any nation which refused to enter into discussions to regulate air warfare would be left in a position of grisly isolation, proclaiming its intention deliberately to make war as a scientific and technical operation upon women and children by the terrorisation of the civil population. It would be a very wise thing for us to get as many nations as possible to join in a convention which would exclude, on paper at any rate, this method from the area of recognised warfare. If necessary, we must even give up "police bombing," even if we were faced with the old difficulty of maintaining order in the mountainous valleys of India without the facilities of an air arm, if there were a world consensus of opinion against the bombing of undefended areas. It would be to our advantage to make the sacrifice in order to secure a much greater gain. It would be asked "Would such agreements ever be kept during the fury and agony of war?" It was not possible to speak with absolute assurance. We should never be justified in trusting our safety to such conventions. But every war was not a general war in Europe. When two Powers were engaged in a narrowly balanced struggle, the opinion of neutrals became of immense importance. We would not assume that international conventions would not play a useful and valuable part if another war should break out. "Even taking the lowest view of human nature, nations at war do not usually do things which give them no special advantage, and which grievously complicate their own position. No convention of the kind of which I have

been speaking would be of the slightest use between the great Powers unless it was based on parity. That is the key to any convention which can be negotiated. If one side had an all-powerful air force and the other only a very weak defence, the temptation to use the weapons of terror upon the civil population might well far outweigh any detrimental effects on neutral opinion. If, however, the two sides were in an equality and in the position to do equal and simultaneous harm to each other, then the uselessness of the crime would reinforce its guilt and horror, and the evil effects upon the actions of neutrals. . . . If both sides feel that they suffer equally from a breach of an international agreement and neither side can see how it can gain an advantage over the other, it seems likely that these conventions will be respected." That was the argument for parity and immediate parity. Parity was the third of the lines which we ought to follow. The fourth was to develop by every conceivable means the effective punishment and destruction by an active and efficient home defence of any invaders who might come to our shores. It ought to be possible by making good arrangements on the ground and in the air to secure very real advantages for the force of aeroplanes which would be defending its own air and which could rise lightly laden from its own soil. By those means we should be able to impose deterrents on an invader, impose deterrents on a potential declaration of war, and gradually, by attrition, to bring attacks on us to smaller dimensions, and finally to an end. Germany was arming fast and no one would stop her. No one proposed a war to prevent Germany breaking the Treaty of Versailles. Germany was ruled by a handful of autocrats, who had neither the interests of a dynasty to consider nor the restraints of a democratic Parliament and constitutional system. Nor had they the restraint of public opinion. "I dread the day when the means of threatening the heart of the British Empire should pass into the hands of the present rulers of Germany." No nation playing the part we played in the world has a right to be in a position where it could be black-mailed.

MR. BALDWIN did not admit that Mr. Eden's tour had been a failure. It had not yet brought its fruit, but he had not yet given up hope of a convention that would give equality in air strength, which he believed was the first requisite for avoiding the danger. The great peril from the air was the attempt of any nation to get a knock-out blow in early. If we got equality, the chances of a knock-out blow almost disappeared, or would become so risky that people would think twice or thrice before undertaking it. The real danger to peace was a very strong air power on the one hand and a defenceless city on the other. He stood by the speech he had made some time ago, but some people had leapt to the conclusion that if what he said was true there was no object in air defences at all. Obviously that was not the case. It was quite true that the bomber would always get through any defence that could be visualised to-day, but the greater the force to oppose it, the greater the chance of casualties among the bombers, and therefore the more thought before invasion took place. Added to that, if there were the possibility of retaliation at once, that again reduced the danger. He did not believe that the world was yet ready for the international police force. His last point was that if the convention failed, neither he nor the Government would relax efforts to start work next morning to get an air convention alone among the countries of Western Europe, even if they could not get in some that were far away. He agreed most warmly with Mr. Churchill with regard to agreements for the definition of specified areas for bombing. He ended his speech with the following striking sentence:—

"I say that if all our efforts fail, and if it is not possible to obtain this equality in such matters as I have indicated, then any Government of this country—a National Government more than any, and this Government—will see to it that in air strength and air power this country shall no longer be in a position inferior to any country within striking distance of our shores."

COL. WEDGWOOD said that the danger was from Germany. The object of air warfare was to attack aerodromes and petrol tanks, and we ought to scatter ours about the country.

LIEUT. COL. MOORE-BRABAZON said that if you lost control of the air at the beginning you would never win a war. He asked for a larger proportion of the defence money for the Royal Air Force.

MR. TURTON moved that more aerodromes should be provided for civil flying in this country.

MR. EVERARD seconded the motion. He asked municipalities to start aerodromes in a small way.

LORD APSLEY complained of the regulations for the licences for aerodromes. He hoped there might be a more speedy system of traffic between aerodromes and the centres of large cities.

SIR PHILIP SASSOON, in reply, endorsed the view that every large centre of population ought to have an aerodrome of its own. He gave some details, and Mr. Turton withdrew his motion.

REAR-ADMIRAL SIR M. SUETER said that the Chief of the Air Staff ought to have resigned rather than accept the figures in the Estimates, which were totally inadequate for the defence of the country.

MR. LOVAT-FRASER raised the question of the noise caused by aeroplanes.

WING-CMDR. JAMES said that there ought to be a complete reorganisation of the Governmental direction of the Services to secure the necessary co-operation, without which the Services would only fight for their own hands.

MR. SIMMONDS said that fears had been expressed that the company formed by the railways and Imperial Airways would put other internal air lines out of business. He asked had the Air Ministry a plan for expanding the Air Force if it should be necessary. He suggested that squadrons should be sent to show the flag in Canada.

MRS. TATE asked that if the Disarmament Conference failed and there should seem no likelihood of success from the Air Convention in a short time, the Government would bring forward supplementary Estimates and not wait till next year to consider the matter again. She asked if it would not have been more economical to spend a larger sum each year instead of letting ourselves fall so far behind in our air development.

CAPT. J. MACANDREW said that in the war, the side that had the best machines had the air supremacy for the time.

CAPT. I. FRASER said that he thought the discussions abroad would be more fruitful if Europe knew that Great Britain really meant air parity.

SIR GIFFORD FOX suggested that the Government might help to increase our number of pilots by encouraging Imperial Airways to have services more than once a week to South Africa and the Far East.

CAPT. CUNNINGHAM-REID spoke in favour of interceptor fighters. He said that we had a machine which could go up four miles in 17 minutes, which included waking the pilot, getting the machine out, and warming up the engine. He said that it would not be easy for hostile bombers to hit vital

points in London, and suggested that our interceptors should be detailed to guard those vital points.

MR. VYVYAN ADAMS said that we should all be standing on the edge of risk so long as air forces were nationally owned, and any nation which joined in the Gadarene adventure of rearmament was merely accelerating the general stampede over the precipice.

CAPT. H. BALFOUR asked about long-term planning. We had buildings at present to accommodate three more squadrons, and bricks and mortar took a long time to put together.

THE FLEET AIR ARM

INTRODUCING the Naval Estimates in the House of Commons on Monday March 12, the First Lord of the Admiralty, Sir Bolton Eyres-Monsell, made the following allusions to the Fleet Air Arm, and to the relations of the Navy and the Air Force. We quote the report from *The Times* :—

"He was sure that the House realised that the Royal Air Force was, alongside the Royal Navy, our first line of defence. The Navy had realised that for a long time, and he deplored the growing tendency to indulge in controversy on the respective merits of the Navy and the Air Force for the protection of the Empire. (Hear, hear.) Such a controversy was wholly mischievous, and must do great harm, not only to the two Services, but to the country. Both Services were vitally necessary. The Navy and Air Force were complementary to each other, and he was sure that as time went on they would become more so.

"The Fleet depended more and more upon its Naval Air Arm. The

MR. MORGAN JONES said that Mr. Baldwin's announcement would be given very careful consideration on his side of the House.

SIR PHILIP SASSOON replied to the debate. As regards Imperial Airways and the railways, there was nothing new in principle in the understandings which had been reached. That they might in certain cases lead to abuses was undeniable, but it should not be assumed that that was certain to happen. If the new machinery were used to stifle the development of internal air transport the Air Ministry would take appropriate steps to remedy the situation.

Admiralty regarded it as the spear-head of the Fleet, and were prouder of it than of any arm of the Service. It was equally true that the Air Force depended on the Navy, for without the Navy its fuel supply, as well as everything else that came overseas, would be in jeopardy. The Air Force was going to help more and more in protecting our commerce in narrow waters, but we must remember that of the large number of British ships at sea all over the world about 85 per cent. were at present out of reach of land-based aeroplanes. It would be impossible to do away with surface ships altogether until commerce took to the air.

"It was perfectly true that the Navy could do nothing to prevent an air attack on London, but a blow on the heart was not the only way of killing a country, and this country could be as surely, if more slowly, killed by striking at her extremities and sinking her merchandise and provender all over the world. The death by 1,000 cuts was just as sure as death by a knock-out blow."

AIR MINISTRY CONTRACTS

CONCERN at the large number of contracts issued by the Air Ministry without competition is expressed by the Comptroller and Auditor-General in his report on the Air Services Appropriation Account for the year ended March 31, 1933. The great bulk of aeroplane and engine contracts placed in 1932, to a total value of £5,350,000, was placed as the result of single tenders, it is stated.

When the matter was submitted to the Air Council they replied that the indirect effect of such competition as had obtained had been considerable. Their letter indicated, however, that any large extension of competition in the near future was not deemed practicable.

"Technical efficiency is, of course, the very life blood of the air service," the letter added. "The Council are determined to make it their first objective to maintain this efficiency, while simultaneously ensuring that the price paid for it is not excessive.

"Since the level of the vote for the purchase of technical equipment is to-day actually lower than in 1925, despite an increase of 63 per cent. in the number of regular

squadrons maintained, the Council feel that the policy they have pursued in this regard has, whilst maintaining efficiency, satisfactorily subserved the no less important end of economy."

Iraq Irregularities

Various irregularities in connection with works contracts in Iraq had been under the consideration of the Air Ministry. They included the rejection of the lowest tender without sufficient reason, purchases without competition, and the failure, after contracts had been placed, to transmit the tenders to the Air Ministry for review.

The Air Ministry had stated that it was considered that the late chief engineer committed an error of judgment in passing over the lowest tender, and that the contract had now been terminated at the end of the minimum period of one year. The excess cost to public funds appeared to have been in the neighbourhood of £1,700.

The gross expenditure for the year was £19,338,104 5s. 11d., a saving on the estimate of £364,595 14s. 1d.

A link with the past broken

WE much regret to record the death of Sir Alexander Bannerman, Bart., at George, Cape Province, S.A., at the age of 63. It seems ancient history—almost like "1066 and all that"—to carry one's mind back to the Air Battalion of the Royal Engineers, which was the direct ancestor of the Royal Air Force. It hardly seems credible that Sir Arthur Bannerman, then a Major, was the first commandant of that battalion. Of course, it is not so very long ago really, for that battalion came into existence in 1911. Sir Alexander was then a balloon expert. He learnt to fly, and took R.Ae.C. certificate No. 213 on April 30, 1912.

Death of Lieut.-Col. H. C. Brinsmead, O.B.E., M.C.

THE death in Melbourne of Lt. Col. Brinsmead, O.B.E., M.C., is especially pathetic, as it has occurred nearly two and a half years after he was seriously injured in an aeroplane crash, which presumably was the cause of his death. He will always be remembered as the man who made civil flying in Australia, and started it so soundly on its path that for years the Commonwealth led the whole world in the length and efficiency of its inland air services. Col. Brinsmead was born in Hampstead in 1883, the son of the managing director of the famous piano firm. He served in the Australian forces during the war, and though he did not learn to fly, he made such a name for himself as Staff Officer of the Australian Flying Corps, that at the end of the war the Defence Department of the Commonwealth thought itself lucky to secure his services as the first Controller of Civil Aviation. In that capacity he arranged for the mail contracts with West Australian Airways and with Qantas, both of which firms have done such sterling work in the "outback." In November, 1931, he was flying to England in the Avro 10, *Southern Sun*, when it crashed in Malaya, and he was slightly injured. In no way dismayed, he transferred to a K.L.M. machine, but

that, too, crashed when taking off from the aerodrome at Donmuang, and Col. Brinsmead was severely injured. From these injuries he never recovered, and was obliged to resign his post as Controller of Civil Aviation. Few men have done more good work for civil flying, and still fewer can point to such a record of practical achievement.

Major Mealing's marriage

MAJ. R. H. S. MEALING, Chief Technical Assistant to the Director of Civil Aviation, was married to Miss M. Courne on March 7. It will be recalled that Maj. Mealing fell from a ladder while inspecting his new home, and sustained injuries to his spine. For his wedding Maj. Mealing was taken to the registry office on a stretcher. All his many friends will, in addition to wishing him all possible happiness in the future, join us in wishing Maj. Mealing a speedy recovery from his injury.

Good news of Mr. Shackleton

SOME weeks ago we informed our readers that Mr. W. S. Shackleton had had to enter a nursing home to undergo an operation. We are very pleased to be able to record that the operation was entirely successful, and that Mr. Shackleton is now well on the way to complete recovery. In fact, when we visited him at the London Clinic, 20, Devonshire Place, he looked better than he has done for very many years. Mr. Shackleton tells us that the operation has completely cured an ailment of ten years' standing, and that it now but remains for him to wait until the wound is healed before getting into harness again. Already he is able to receive callers and to attend to business, should any FLIGHT reader wish to get in touch with him.

To commemorate Col. Richmond

IN memory of Col. V. C. Richmond, the designer of R.101, Mrs. V. C. Richmond has had electric light installed in the parish church at Odell, Bedfordshire.

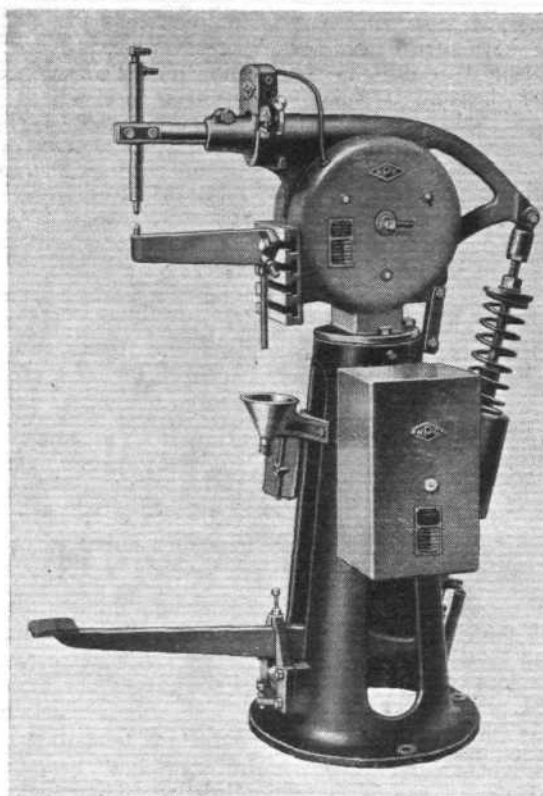
ELECTRIC RESISTANCE WELDING

A description of an electric resistance welding machine, the construction of which eliminates the human element and allows consistent and satisfactory welds to be made, even in stainless steel. It has therefore a wide application in the aircraft trade

IT is now some 45 years since electric resistance welding was invented by one Elihu Thomson. In its essentials it consists of clamping together two or more pieces of metal between two highly conductive electrode points and passing a heavy current of low voltage between them. As the resistance of the metal is greater than that of the electrodes or welding tips, it becomes heated to fusion heat while under the clamping pressure. The heat in this type of welding is purely local and practically no distortion therefore occurs.

For many years rivetting has been one of the chief methods of joining metal to metal in aircraft construction, and it is not so very long ago that even normal welding with an oxy-acetylene flame was not permitted by the Aeronautical Inspection Directorate without the added safeguard of rivetting any stressed parts. Progress has, however, been made, and spot welding is now acknowledged to be as strong as, and in most cases cheaper and quicker to do, than rivetting.

As the process became more widely used it was realised that there were other difficulties to be overcome besides the main problem of securing a consistent and reliable weld. For example, the use of stainless steel has now become almost standard practice in aircraft construction where severe corrosion problems have to be overcome in many parts of seaplanes and flying boats. Early attempts to spot-weld this material proved abortive, as the methods of those days destroyed the nature of the material at the welds and provided a further source of possible corrosion in addition to the unavoidable blemishes of manufacture. It is, however, possible to make spot-welds with a very much higher current density than before, and by the use of water-cooled welding tips of larger area to achieve a weld wherein the exposed surfaces of the metal at the weld are left in their original state. The process is a very rapid one and achieves its object by completing the weld before the heat generated has time to overheat the metal in contact with the welding tips, and the claim is made that these welds are in every way as satisfactory as those produced with a more prolonged current application. There is also another disadvantage inherent in many methods of spot welding, and that is the difficulty in obtaining consistent welds. Many of the spot-welding machines rely either on the operator to determine the length of the welding operation or on some regular mechanical means whereby exactly the same time is given to each weld, regardless of any variation in the material at that particular point. It does not require very much imagination to see that this method can, and does, have severe drawbacks. If the metal were absolutely even and perfectly clean, the percentage of satisfactory welds would be high, but when scale, grease or



A typical N.P.C. spot welding machine of a size suitable for work on aircraft construction.

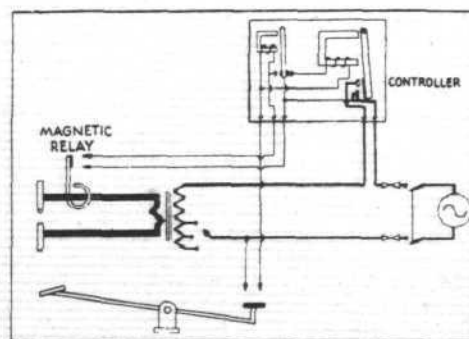
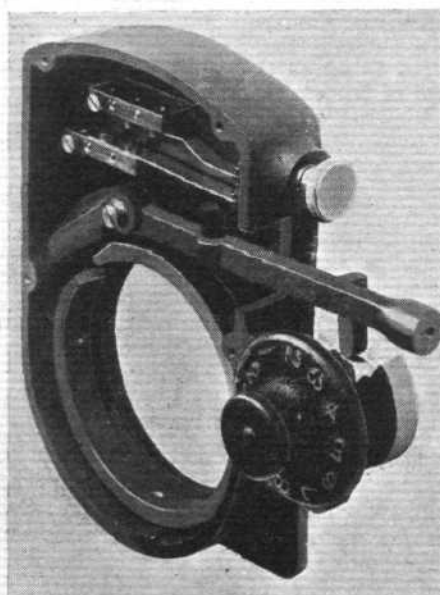
unevenness are present there is bound to be a comparatively high proportion of failures. In aircraft construction this is a state of affairs which cannot be tolerated, and we are therefore particularly interested in the N.P.C. automatically-controlled type of spot-welding machine developed by New Process Welders, Ltd., Scotts Road, Southall, Middlesex.

This company have developed a controller which does away with the necessity for skilled operation, is easily adjustable for a wide range of materials, and after adjustment, a matter of a few seconds only, can be relied upon to produce consistent welds. With this type of controller it is an easy matter for the foreman to make a few test welds on specimen pieces of the metal in use, after which the operator can carry on and the Inspection Department will know that the resulting welds will be consistent and satisfactory.

The N.P.C. spot-welding machine has a particularly robust transformer wound, ring fashion, on a laminated iron core built up of a series of complete circular rings of the best quality insulated electric steel. Round this ring core the primary windings are distributed according to the voltage for which the machine is wound. When complete, the core and primary winding are enclosed in two bronze castings forming the single-turn secondary winding and having an axle passing right through the core. The electrode-carrying arms are attached to each of these castings.

The controller which plays such an important part in this particular machine operates in conjunction with a magnetic relay consisting of an open iron circuit nearly encircling the upper electrode arm. A lever, with a soft iron armature attached, is placed so that the armature is directly over the open space of the iron circuit. When the spot welder is in operation, the current flowing between the welding tips, through the electrode arms, generates a magnetic field, and so the armature is attracted to the iron circuit. This moves the lever, closing a pair of platinum points, and breaking the primary circuit so that the welding ceases immediately. A special arrangement is also incorporated to prevent chattering due to the magnetic relay, as it were, cutting off the field which operates it.

It will be seen from this brief description that the length of welding depends entirely on the resistance of the metal being welded at that particular moment. The current per-



A circuit diagram of the N.P.C. welder showing the action of the magnetic relay and controller.

A photograph of the magnetic relay, showing the cam by which the armature is placed so as to control the time of welding. The numbers on the dial are for reference only. (FLIGHT Photo.)

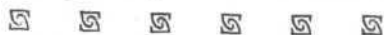
forming the welding operation continues to flow until such time as its magnitude has grown, by virtue of the decreased resistance between the welding tips due to the better contact obtained as the metal is heated, to such a point that the strength of the magnetic field generated is sufficient to work the controller. Thus, no matter what the condition of the metal is between the welding tips, the welds will always be consistent.

Another interesting part of the controller is the pedal relay switch which starts the welding operation and also unloads the predetermined pressure of a spring on to the work. This is entirely independent of the foot pressure on the pedal and ensures that the work is always

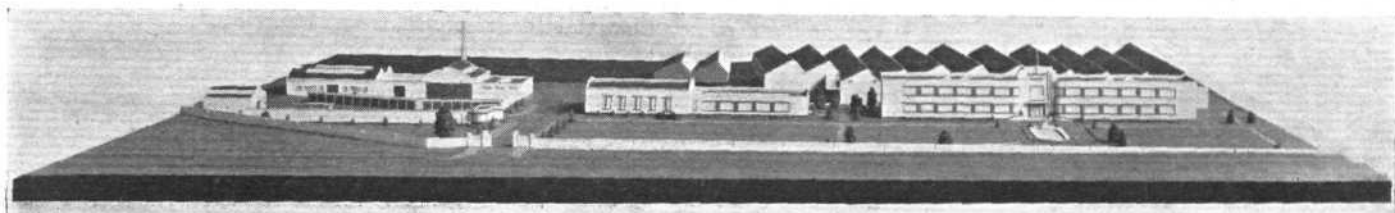
clamped together with a uniform pressure. Aircraft manufacturers have already shown their interest in this machine, and the following are the results of some actual tests on stainless steel.

The material used was D.T.D. 171, the average depth of indentation 0.0042 in., and the average shearing strength of the welds was found to be 937 lb.

Micro examinations showed, not only that there was no trace of unsoundness, but also that the fused portion of the metal was in the region of 75 per cent. of the final thickness, leaving a skin of unfused metal on the surface. Pickling tests could disclose no cracking at the welds due to internal stresses set up by welding.



The Industry.



D.H.'s NEW HOME : A model of the new de Havilland factory now in process of construction at Hatfield. Here, adjoining the aerodrome to the extent of some 190,000 sq. ft., will be produced the D.H. aircraft and engines, hitherto turned out at Stag Lane.

CORROSION TESTING STATION

A STATION has been opened at Mersea Island, off the Essex coast, for the purpose of testing the immunity of paints, metals and other products from deterioration due to the action of sea water, sea air, ozone and sunlight. An independent means is thus provided for carrying out much more exhaustive and rigorous tests than the usual method of spraying specimens with sea water in a closed chamber. This latter method, however conscientiously employed, is inconclusive for several reasons. In the first place, the specimen is more or less at the same temperature throughout the test, which does not prove very much in the case of paints which may be spread on metals with a varying temperature. Again, a sprayed salt solution usually remains at constant strength, whereas under working conditions, when the sea splashes on to a material, the sun evaporates the water, leaving dry salt which may subsequently be washed into cracks or pores in the form of a more concentrated salt solution. The possible disintegrating effects of the sun and of ozone, one of the most destructive gases associated with sea corrosion, are also not usually represented in artificial methods of testing.

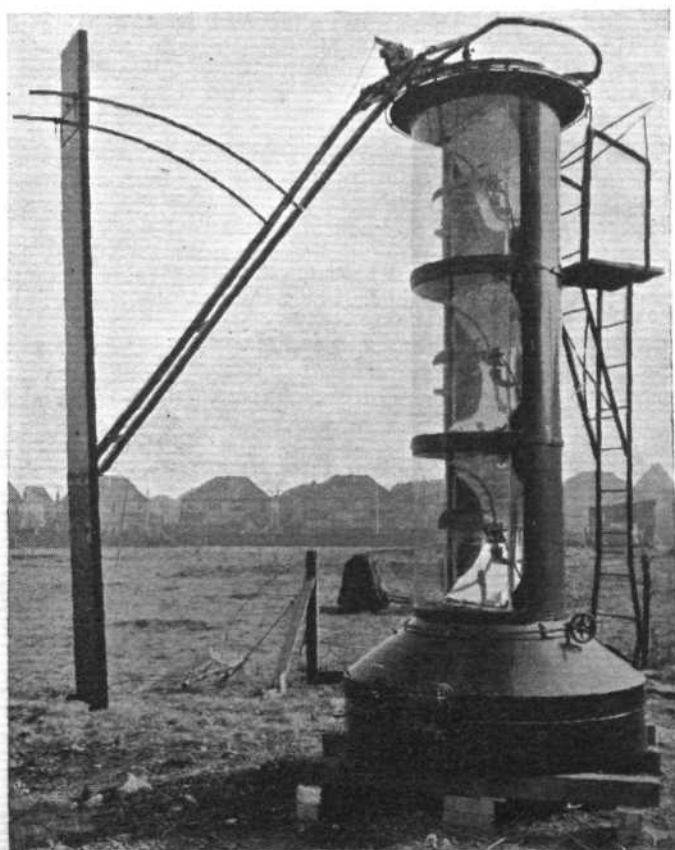
In contrast to these objections, the mud flats off the Essex coast, covered by the sea at each tide, provide an ideal site for testing all marine corrosive actions. At the Mersea Island Testing Station, specimens under trial are normally placed so that at high water they are immersed in the sea for periods of between one and two hours. When the water recedes they are exposed to the sun and wind, and later to the ozone released from the mud by the sun. Other tests, such as total immersion in sea water for any required period, can be arranged.

The station was originally started by Mr. F. E. Robinson, of the Marconi Company, but in future, by consent of the company, the scope of the station will be extended and will be conducted as an independent testing station under the supervision of Mr. L. M. Robinson, Assoc.M.Inst.C.E. Its services will be at the disposal of public authorities and engineers who wish an independent report on materials, and manufacturers who wish to have their products tested under natural conditions.

A VERSATILE FLOODLIGHT

A DEMONSTRATION was given recently at the G.E.C. experimental establishment at Wembley, of a new type of 9-kw. landing floodlight, which is also useful as a beacon, fitted with a shadow bar. The first light of the

type is soon to be shipped to Dum Dum Aerodrome at Calcutta. In theory the new light is similar to the older type of G.E.C. 9-kw. floodlight, but uses three 3-kw. Horizon type Osram lamps of 1,250,000 beam candles. The collapsible shadow bar, which is controlled by a hand rail from a platform at the rear of the light, casts a clean-cut shadow 36 ft. wide at 700 ft. Current, which may be of the D.C. or A.C. type, is obtained direct from the main. As a beacon, the light is revolved eleven times a minute by a very neat electric motor housed in the base. All parts are



The new G.E.C. floodlight.

easily accessible, manholes being provided at the back of each of the three lamp sections and in the base covering over the electric motor. The base, which is usually mounted in concrete, is made from cast iron and the body of the lamp is of sheet copper to prevent corrosion. A system of dust louvres protects the mechanism. The ladder, which is normally used for climbing to the platform for operating the shadow bar, may be swung round the lamp for focussing and cleaning purposes. Complete with shadow bar, ladder, platform, etc., the light weighs $1\frac{1}{2}$ tons.

The P.B. automatic control

WE announced, and briefly described, in our issue of November 23, 1933, a new automatic gyroscopic control, or "pilot's assister," invented by Mr. J. Pollock Brown, M.I.Mech.E. At the time of that announcement the instrument controlled only the rudder of an aircraft, but since then it has been further developed and now controls rudder and elevators. Recently we accompanied Mr. Philip Bailey, who is responsible for the testing of the apparatus, in his "Puss Moth," in which the new control is fitted. The gyroscope manages the second control as easily as the rudder. It is unnecessary in the opinion of the inventor to automatically control the ailerons, the extra gear would justify its existence only in very bad weather, a dihedral angle sufficing in normal conditions. It is not possible to publish at present a full technical description of the instrument, but we would recall that the corrective impulses are transmitted through oil. It is practically impossible to lose pressure in the system and all the working parts are generously lubricated. After the new instrument to control rudder and elevators had been suggested, it was designed, built, tested and approved in three months. The complete apparatus as at present installed in Mr. Bailey's "Puss Moth" weighs 25 lb.

Vickers' Dividends

THE directors of Vickers, Ltd., recommend, for the approval in general meeting, a dividend for the year 1933 at the rate of 4 per cent., less income tax at 5s. in the £, on the ordinary shares of the company. This dividend, if approved, will be paid on Wednesday, April 4. The company also announces that Mr. Arthur Terence Maxwell, a partner in Glyn Mills & Co., was appointed a director of the company at the board meeting held on March 8.

British wireless for Iraq

SOME twelve months ago Standard Telephones & Cables, Ltd., fitted the D.H. "Dragons" ("Gipsy Major"), of the Iraq Air Force, with their ATR.4 transmitting and receiving wireless sets. As a result of the satisfaction which these sets gave, the company has now received an order to equip the recently ordered Hawker "Audax" (R.R. "Kestrel") aircraft with similar instruments.

General aircraft developments

AN increase in capital to £100,000 has been announced by General Aircraft, Ltd. Coincident with this announcement is that of an addition to the board of Mr. W. S. Stephenson. The capital of the Monospar Co., Ltd., has also been increased to £50,000, on control being acquired by General Aircraft, Ltd. An extended production pro-

gramme has been embarked upon for both the standard and retractable types of the Monospar S.T.4, while a larger machine, the S.T.6, is being placed in production this year. The board of General Aircraft, Ltd., now consists of Mr. H. J. Stieger, Chairman and Managing Director; Mr. W. S. Stephenson, and Flt. Lt. H. M. Schofield, General Manager.

Hadfields valves

HADFIELDS, LTD., of Sheffield, have just issued a leaflet which recalls, in illustrated form, the fact that Hadfields "Era ATV" steel exhaust valves have helped to make history by being fitted in the Supermarine-Napier Schneider machines of 1927 and 1929, in the Gloster-Napier Schneider machine of 1929, in the engines of Segrave's *Golden Arrow* car and *Miss England* motor boat, in Malcolm Campbell's *Bluebird* car, in Kaye Don's *Silver Bullet*, in Scott Paine's *Miss Britain III*, and in the Napier engine of the Fairey long-range monoplane. Hadfields, Ltd., it may be recalled, hold the sole rights of manufacture and sale of "Era ATV" steel in the British Empire.

For model makers

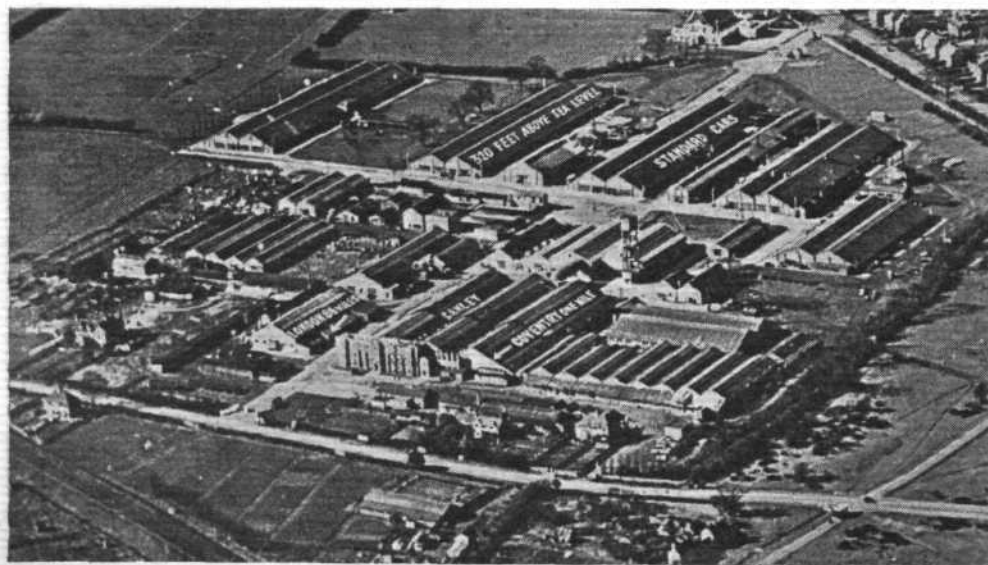
FROM F. R. Barnard, of 2A, Hornsey Rise, Upper Holloway, London, N.19, we have received a very useful price list, which includes woods, such as Balsa, silver spruce and birch, glues, tools, blue prints of models, kits of model materials, propellers, rubber, and Cellon dope. Inquirers may like to know that the telephone number is Archway 2376.

More Aerial Signposts

CAPT. J. P. BLACK, managing director of the Standard Motor Company, is to be congratulated on his foresight and initiative in having the roof of his factory at Canley, near Coventry, turned into an aerial signpost. Thereon he has had painted the distance to various important towns, together with an arrow giving their direction (the magnetic bearing in large letters would have been still more valuable.—ED.). He has also proposed that all the principal agents of the company shall be asked to follow suit. The adoption of this scheme, which combines factory advertisement with great utility, by a firm not, as yet, connected directly with the aircraft trade, is significant of the increasingly important place which aerial travel is taking in this country. As far back as the year 1919, Short Bros., Ltd., at Rochester, started the idea, and since that time many firms like Cellon, Ltd., at Kingston, K.L.G., Ltd., somewhat nearer London, and many others about the country have used the roofs of their factories, not only to advertise their names to airmen, but also to help those airmen with directions. Municipalities have also, in many cases, caused the names of their towns to be painted in prominent positions where they can be most helpful and, in Leicestershire in particular, the gas companies have been induced by a prominent private owner to "name and arrow" the tops of their gasometers. Therefore, if Capt. Black's example is followed by other motor-car and non-aviation firms, we shall soon be able to fly about England without any maps at all!

The Standard sign was officially inaugurated on Thursday, March 8, by a luncheon, at which Mr. R. W. Maudslay presided, at the Standard Motor Company's works. The guests to the luncheon were flown up from Hanworth Aerodrome in a "Dragon" (from Western Airways, Ltd.), two "Couriers" and a Desoutter (from the Aircraft Exchange & Mart, Ltd.).

An extension of the scheme to include illuminated signs is understood to be under consideration.



AERIAL SIGNPOSTS: A view from the air of the Standard Motor Co.'s works, near Coventry, showing the various items of information for airmen painted on the roofs.

THE ROYAL AIR FORCE

London Gazette, March 6, 1934

Air-Commodore A. W. Iredell, M.R.C.S., L.R.C.P., is appointed an Honorary Physician to the King (Feb. 14).

General Duties Branch

The follg. Pilot Officers are promoted to rank of Flying Officer (Jan. 23):—
F. C. de la P. Beresford-Peirse, C. Broughton, R. A. C. Carter, D. R. Evans, R. J. Gosnell, D. J. P. Lee, H. G. Leonard-Williams, C. R. D. L. Lloyd, C. C. Morton, M. H. Rhys, T. U. Rolfe, R. H. Shaw, W. E. S. Tanner.

Wing-Com. P. C. Sherren, M.C., is restored to full pay from half-pay (Feb. 19); Wing-Com. E. B. Beauman is placed on half-pay list, scale B (Feb. 24); Sqdn.-Ldr. R. A. George, M.C., is placed on half-pay list, scale A, from Jan. 7 to Feb. 4 inclusive, and from Feb. 9 to 15 inclusive; Sqdn.-Ldr. H. S. Kerby, D.S.C., A.F.C., is placed on half-pay list, scale A, from Feb. 11 to 18 inclusive. The follg. Flight Lieuts. are placed on retired list:—E. E. Arnold, D.F.C. (March 1); E. Drudge, M.B.E. (March 4).

F/O. B. J. Hurren is transferred to the Reserve, class A (Feb. 26); Flt.-Lt. J. McGuinness is cashiered by sentence of General Court Martial (Feb. 23).

Memorandum

232260 Flt.-Cadet H. B. Davies is granted an hon. commn. as Sec. Lt. with effect from date of demobilisation.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Wing Commander F. W. Trott, O.B.E., M.C., to No. 2 Armament Training Camp, N. Coates Fitties, 26.2.34, to Command.

Squadron Leaders: H. M. K. Brown, to H.Q., Central Area, Abingdon, 26.2.34, for Armament duties. A. C. Sanderson, D.F.C., to Air Ministry, Dept. of C.A.S. (D.O.I.), 26.2.34, for Air Staff duties, vice Sqdn.-Ldr. R. L. Stevenson, M.B.E. R. L. Stevenson, M.B.E., to Air Armament School, Eastchurch, 26.2.34, for Specialist Armament Course. E. R. Openshaw, A.F.C., to No. 1 Armament Training Camp, Catfoss, 26.2.34, for Armament duties. E. Thornton, to No. 1 School of Tech. Training (Apprentices), Halton, 2.3.34, for Engineer duties with No. 1 (Apprentices) Wing, vice Sqdn.-Ldr. L. J. Maclean, M.C. F. W. Walker, D.S.C., A.F.C., to No. 57 (B.) Sqdn., Upper Heyford, 26.2.34, to Command, vice Wing-Com. F. W. Trott, O.B.E., M.C. F. R. Wynne, M.B.E., to H.Q., Coastal Area, Lee-on-the-Solent, 26.2.34, for Photographic duties vice Flt.-Lt. E. Drudge, M.B.E.

Flight Lieutenants: V. Croome, to No. 23 (F.) Sqdn., Biggin Hill, 26.2.34. H. M. Groves, to No. 24 (Communications) Sqdn., Hendon, 26.2.34. A. J. Long, to R.A.F. Depot, Uxbridge, 26.2.34. F. H. Shales, to Station H.Q., Farnborough, 27.2.34. F. H. Whitmore, M.B.E., D.S.C., to R.A.F. Base, Gosport, 26.2.34. E. S. Borthwick-Clarke, to Station H.Q., Netheravon, 1.3.34. G. L. Carter, to No. 5 Flying Training School, Sealand, 1.3.34. S. H. Hardy, to No. 503 (County of Lincoln) (B.) Sqdn., Waddington, 26.2.34.

ROYAL AIR FORCE RESERVE RESERVE OF AIR FORCE OFFICERS

General Duties Branch

N. T. Tangye is granted a commn. as Flying Officer in class A (March 6); P/O. I. R. Parker is promoted to rank of Flying Officer (Nov. 19, 1933); F/O. E. Batchelor is transferred from class AA (ii) to class C (March 7); F/O. B. W. Barton resigns his commn. (Feb. 17).

SPECIAL RESERVE

General Duties Branch

F/O. W. H. Armstrong resigns his commn. (Nov. 18, 1933).

AUXILIARY AIR FORCE

General Duties Branch

No. 600 (CITY OF LONDON) (BOMBER) SQUADRON.—F/O. N. T. Tangye resigns his commn. (March 6).

No. 605 (COUNTY OF WARWICK) (BOMBER) SQUADRON.—F/O. E. S. Lambert resigns his commn. (Dec. 2, 1933).

J. A. Hawkins, to No. 55 (B.) Sqdn., Hinaidi, Iraq, 31.1.34. A. D. Rogers, A.F.C., to H.M.S. *Courageous* 12.2.34.

Flying Officers: W. R. Beaman, to Station Flight, Duxford, 23.2.34. J. D. Baker-Carr, to Air Armament School, Eastchurch, 26.2.34. R. J. O. Bartlett, to No. 1 Armament Training Camp, Catfoss, 28.2.34. J. N. Baxter, to No. 3 Armament Training Camp, Sutton Bridge, 26.2.34. W. E. Coope, to Air Armament School, Eastchurch, 26.2.34. R. B. Dashper, to Air Armament School, Eastchurch, 26.2.34. W. F. C. Hobson, to Air Armament School, Eastchurch, 26.2.34. H. H. Leech, to School of Naval Co-operation, Lee-on-the-Solent, 1.3.34. D. M. T. Macdonald, to Air Armament School, Eastchurch, 26.2.34. J. G. G. Moore, to Air Armament School, Eastchurch, 26.2.34. C. V. J. Pratt, to No. 22 Group H.Q., S. Farnborough, 28.2.34. E. G. Reed, to Station H.Q., Ramleh, 9.2.34. J. O. Willis, to No. 810 (F.T.B.) Sqdn., 21.2.34. G. Bearne, to No. 2 Armament Training Camp, North Coates Fitties, 26.2.34. E. S. D. Drury, to No. 1 Air Defence Group H.Q., 26.2.34. H. Ford, to No. 1 Armament Training Camp, Catfoss, 26.2.34. M. L. Heath, to Station H.Q., Boscombe Down, 26.2.34.

Stores Branch

Flight Lieutenant W. J. Cleasby, to Station H.Q., Heliopolis, 12.2.34.

NAVAL APPOINTMENT

The following appointment has been made by the Admiralty:—
Lt.-Com. (FH.-Lt., R.A.F.).—J. B. Heath, to *Victory* for R.A.F. Base, Gosport (March 17).

Nomenclature of Aeroplanes

THE "Gordon II."—The official name of the Gordon now under construction is the Gordon II. This name is to be used in all correspondence and reports relating to this aeroplane. The Gordon II is similar to the Gordon I except that it is fitted with a modified rear fuselage and frise ailerons. A new tail unit has also been added to harmonise controls.

THE "Nimrod II."—The official name of the Nimrod now under construction, with swept-back wings and larger tailplane, is Nimrod II.

THE "Vildebeest III."—The official name of the Vildebeest aeroplane now under construction with an altered rear cockpit and gun mounting and a third seat behind the pilot, is Vildebeest III. Attention is drawn to the corrected spelling of the name of this aeroplane; all documents and publications relating to previous mark numbers of the aeroplane and bearing the name "Vildebeeste" are to be amended by the deletion of the final "e."

Designation of Fleet Air Arm Squadrons

The following table shows the respective titles of Fleet Air Arm squadrons and flights that are to be used in all official correspondence and orders in the field:—

Function	New full title to be used in official correspondence	Abbreviated title for use in orders in the field
Fleet Fighter	No. 800 (Fleet Fighter) Squadron	800 (F.F.) Sqdn.
	No. 801 " " " "	801 " "
	No. 802 " " " "	802 " "
	No. 803 " " " "	803 " "

Spotter Reconnaissance	No. 820 (Fleet Spotter-Reconnaissance) Squadron	820 (F.S.R.) Sqdn.
	No. 821 " " " "	821 " "
	No. 822 " " " "	822 " "
	No. 823 " " " "	823 " "
	No. 824 " " " "	824 " "
Torpedo-Bomber	No. 810 (Fleet Torpedo-Bomber) Squadron	810 (F.T.B.) Sqdn.
	No. 811 " " " "	811 " "
	No. 812 " " " "	812 " "
Fleet Fighter	No. 403 (Fleet Fighter) Flight	403 (F.F.) Flt.
	No. 406 " " " "	406 " "
	No. 407 " " " "	407 " "
Fleet Spotter-Reconnaissance	No. 443 (Fleet Spotter-Reconnaissance) Flight	443 (F.S.R.) Flt.
	No. 444 " " " "	444 " "
	No. 447 " " " "	447 " "

Air Force List

The March issue of the Air Force List has now been published. It can be purchased (price 2s. 6d.) from H.M. Stationery Office at the following addresses:—Adastal House, Kingsway, London, W.C.2; 120, George Street, Edinburgh; 2, York Street, Manchester; 1, St. Andrew's Crescent, Cardiff; 15, Donegall Square, Belfast; or through any bookseller.

R.A.F. display at Cairo

ON Friday, February 23, the Royal Air Force Display was held at Heliopolis Aerodrome, when Mistr Airwork exhibited one of their "Dragons" and a "Fox Moth" in the Aircraft Park. Considerable interest was shown by H.R.H. the Prince of the Said, and also by H.E. the High Commissioner. Hundreds of members of the public passed into the "Dragon" and tested the seats and inspected the control cabin.

British engines for Belgium

THE Belgian Government has recently placed an order for 36 Rolls-Royce "Kestrel" engines, to be put into the Fairey "Firefly" and Fox machines being built at the Belgian Fairey works at Gosselies. As this is the fourth time orders have been placed, it seems fairly obvious that Belgium is satisfied.

French re-equipment

IN connection with the re-organisation and re-equipment of her defence forces, France is planning a new programme of aircraft building, in which "quality rather than quantity" is to be the keynote. The French Air Ministry is to be allotted 930,000,000 francs (about £11,625,000) for the equipment of the Air Force.

The new re-equipment programme will be largely governed by the choice of a technical director-general. M. Albert Caquot has recently resigned that post in order to give place to a successor more in sympathy with the new policy. His successor has not yet been nominated, but there is a strong volume of opinion in France that about the only man who could successfully take over the post is M. Paul Dumaouis. M. Caquot, it may be remembered, was the technical chief of the policy which became known as the *politique de prototypes*.

Correspondence.

The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.

DIRECT LIFT

[2916] In your correspondence columns of February 22 there appears a letter which raises many interesting points.

Mr. Wilde, in his lengthy, but nevertheless extremely vague, letter, takes the rather irritating part of one who proudly admits to a deep secret, but "won't say nuffin." Still, in the course of a column-and-a-bit we are told many startling and hard facts, although they are rather unkind to ourselves and those we used to regard as our betters, but who would now seem to be the very bogeymen of aviation. For we learn that these wicked and evil engineers, and designers if you please, have been concentrating on lifting from a short run, yet, as Mr. Wilde says, the time will shortly come when we cannot lift any more quickly, so now we all know at last how we have been had. I must admit that my first thought on reading this sentence was one connected with liquor rather than take-off, but as it must surely be possible to imbibe still more of the national beverage from 9.45 till 10, or the world had better perish for lack of idealism, I confess to my error.

If my great-uncle's memory is what it used to be, the same was said, about aeroplanes this time, in 1912, again in 1916, and now again, as we see, by Mr. Wilde. So the sad fact must be faced: we shall never, but never leave the ground bang, like that, or so we are told.

But then, of course, there is the principle of direct lift, discovered by an absent-minded scientist of obscure origin and worse antecedents, and taught in a school for deserving suburban ladies of limited means and expensive tastes, for to be practised in Harrod's and similar tempting institutions. And all designers, dull and dowdy, gushing and gloomy, have been running around blindfolding themselves contentedly to this promising fact. And so they just designed and built, one after another, stupid little wings to be towed along, if you please, and cause a pressure underneath. And some very clever blokes actually did believe that there were also whatnots on top, but, of course, one doesn't discuss these things in the parish.

I will not sign my own death-warrant by arguing about Mr. Wilde's schemes for obtaining direct lift or upsetting the poor gyro-couples, the cruel man; he has given us the answer and it is our duty to make use of it. Yet how many, myself included, have not wept with relief to hear that the rotor of the "Autogiro" is definitely *not* driven by direct power, a thing one was never sure of somehow, hence the fearsome controversy that will result. . . . But all is not lost to us, ill-informed engineers, for reaction can only be overcome by reaction, which to those of us who love to express our thoughts in the most complicated way possible, must be like the slap in the face with a wet fish.

And may I now, as a penance, disclose my startling vision of the flying vehicle of a more bright and cheerful future? The body or fuselage will be like an old-fashioned horse-drawn omnibus, the passengers sitting on top in the fresh air, the inside being used for the engineer and donkey-man and their twelve trained donkeys, each or all driving six reactionless vanes or windmills. These direct-lift contraptions are built up of de-valuated cigarette coupons, and, in places, wrapped in five-pound notes, to bring the ship up to the advertised value. All passengers are provided with oars which they are to use or forfeit their fare, whenever they are told, on one side at a time, in order to steer the craft on any rocks that look good enough.

The torque-reaction, suitably harnessed, is let out to the highest bidder to sit next to the aspidistra in the drawing room on the little table, and snap smartly at anyone so ill-advised as to speak on the subject of landing speed.

The Hague, Holland.
February 27, 1934.

"PARKBENCH AILERON."

A very useful handbook

THE Bristol Aeroplane Co., Ltd., has recently issued a handbook dealing with the Bristol "Pegasus" engines. Although primarily intended for users of these engines, the Bristol Company informs us that a few copies have been reserved for those who are seriously interested in Bristol engines, but who have not yet purchased. The handbook is a very wonderful publication, dealing as it does with every detail of the "Pegasus" types and giving directions for installation, running, maintenance and overhaul. It is produsely illustrated by photographs, drawings, diagrams and sketches. In view of the high cost of producing such a publication, the Bristol Aeroplane Co., Ltd., asks us to point out that the "Pegasus" Handbook cannot be supplied indiscriminately, but readers of FLIGHT who can establish reasonable claims to consideration have a chance of securing a copy while the supply lasts.

A "Hawk" catalogue

ALL the many merits of the Miles "Hawk" are justly extolled in an excellent booklet which we have received from Phillips & Powis (Reading), Ltd. By means of a system of indexing it is possible to refer to any of the six sections of the catalogue. We are told that during Martelsham trials, which, as our readers may know, were passed in 24 hours, ballast of lead equivalent to a petrol load for 19½ hours' flying, or a range of 2,000 miles, was carried, and in this condition a terminal velocity dive was made with a pull out of 3G. Specification, performance figures, G.A. drawings and a helpful "cut away" sketch by Mr. P. Stimpson are included. A table based on 100 hours' flying per year puts the aggregate cost at £1 8s. 8d. per hour. The list of opinions regarding the performance of the machine should be sufficiently convincing for the most sceptical buyer. An invitation to visit the works and aerodrome at Reading is extended by the manufacturers to all who are interested in aviation.

Of philatelic interest

THOSE of our readers who are collectors of air mail covers and stamps should note that A. Phillips, the Newport (Mon.) Philatelists have opened fine new premises at 4-5, Dock Street, Newport, where everything relating to this popular branch of stamp collecting may be obtained.

Change of address

REDWING AIRCRAFT CO., LTD., formerly of Blue Barns Aerodrome, Colchester, have now moved to Croydon Airport, where all communications should be addressed.

For the drawing office

THE name of A. W. Faber is well known in connection with their big range of pencils, but there is also another item associated with the drawing office in which they have specialised. This is the production, backed by many years of experiment, of a range of slide rules that will give any calculation required for any particular trade or profession. Full particulars of these slide rules, and other drawing office material, may be obtained from A. W. Faber, 13-14, Camomile Street, London, E.C.3.

INCREASE OF CAPITAL

COMMERCIAL AIRWAYS (ESSEX), LTD., Loughton Aerodrome, Abridge, Essex.—The nominal capital has been increased by the addition of £7,000 beyond the registered capital of £1,250. The additional capital is divided into 2,000 7 per cent. non-cumulative preference and 5,000 ordinary shares of £1 each.

PATENT AERONAUTICAL SPECIFICATIONS

Abbreviations: Cyl. = cylinder; i.c. = internal combustion; m. = motors (The numbers in brackets are those under which the Specification will be printed and abridged, etc.)

APPLIED FOR IN 1932

Published March 15, 1934

- 13,229. BENDIX AVIATION CORPORATION. Intake systems for internal-combustion engines. (406,002.)
36,324. FAIRLEY AVIATION CO., LTD., and A. G. FORSYTH. Cyl. block and crank case of i.c. engine. (406,118.)

APPLIED FOR IN 1933

Published March 15, 1934

- 9,152. PETERS, LTD., and A. DAVENPORT. Cockpit windcreens for aircraft. (406,138.)
11,046. C. LORENZ AKT.-GES. Method and device for guiding aeroplanes by means of short waves, particularly ultra-short electromagnetic waves. (406,144.)